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Modern Views on Soap

Part I

Action of Soaps as Colloids—"Sols," "Gels" and "Curds"—Cooling of Soap Solutions—Soaps as Emulsions —Peculiarities with Indicators—"Ionic Micelle"—Internal Structure in Soap Solutions— Motion in Soap Solutions—Fibrous Structure of Curds

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IN spite of all the years since the first fat was made into a crude soap by the aid of wood ashes, soap is still very much a mystery. As with textile fibers and many other materials used in the industry, the men in the mill have been more successful, or at least much quicker, in working out the practical relations than the scientists have been in explaining them. We are now, however, well on the way toward understanding the "theory" of soaps and may soon expect the advances in practice that always follow a real understanding of the "why" of things.

Research workers in both England and America, some of them with eyes wide open to practical points, have already given us many interesting explanations of soap activity. Our purpose here is a brief review of the more recent publications, some of which are not very accessible, with the hope that it will add interest to the everyday use of soap in the mill and perhaps furnish useful suggestions.

The old idea of a soap solution has been very much changed. When an actual *neutral* soap is dissolved in water it has an *alkaline* reaction the same as a dilute solution of caustic or soda ash. This alkalinity, due to a very small amount of the soap going back by hydrolysis into fatty acid and free caustic, was formerly held to be responsible for a large part of the scouring and cleaning effect.

Soaps Are Colloids

It has been found, however, that this is not a sufficient explanation, as a caustic solution of alkaline strength equal to the soap, or even stronger, while it has more cleaning action than water alone, does not have an effect nearly equal to that of soap.

The remarkable properties of soaps are, rather, to be attributed to their action as colloids. This statement, however, is far from an explanation in spite of the fact that the mere characterization of a thing as colloidal has often served as a broad and complete explanation, ranking with "chemical affinity" as a convenient parry for a thrust at our ignorance. Now, however, we are describing and measuring the particles and the properties of colloidal systems, and soap is getting its full share of attention.

While in the past we were well satisfied with pure chemical explanation of things, we now realize that in many cases physical properties are even more significant. Colloids are not a class of materials, but representatives of a state of matter; more specifically, matter in a finely divided condition. The large particles are just too small to be visible in the ordinary microscope, while the smaller approach closely to molecules in size. The action of soap, then, is not entirely chemical, but depends very largely on the properties of a mass of soap particles suspended in water, on the vast total of surface area of these particles, and on their union into more or less systematic "structures"; in other words, upon both chemical and physical properties.

An ordinary piece of soap has certain properties which we all know; if we cut it up as finely as possible it still has them. The pieces are smaller and their combined surface is larger, but there is no other change. However, if subjected to the action of an acid, for example, the reaction would be much more rapid with the fine soap than with the single piece. This illustrates in a crude way the colloidal state. If the subdivisions could be extended until we had an infinite number of pieces there would be still greater activity due to the still larger surface exposed. We finally reach a stage where fineness of particles and extension of surface have not only changed the intensity of a given reaction, but may have

given rise to quite new effects. Dissolving a soap in water has the effect of subdividing it into a vast number of particles, and it will be seen a little later that these behave in their own peculiar way, which is quite different from that of a soap merely chopped to extreme fineness.

Recent research on soaps has been conducted from somewhat different but related points of view. There has been work on the structure and composition of soap jellies and curds as well as solutions, other work on the nature of the ultimate particles of soap in these different states, and, finally, the establishment of connections between such data and the familiar washing and scouring operations. The discussion logically follows this order, and the numerous practical or semi-practical points brought out may serve as hints for operating efficiency.

Fischer's[1] new book gives a quite complete discussion of the general physical properties of soap solutions. Soaps are made of fats or oils of animal or vegetable origin, which, like all other products of nature, are not perfectly pure substances but vary with the geographic source and with the seasons. Most soaps are purposely made of mixtures of fats, and the fats are in their turn mixtures varying in the proportions of their normal fatty constituents as well as in the kinds and amounts of unsaponifiable matter, alcohols and other organic materials. One of the cardinal principles of such research is to start with pure materials so that one factor at a time can be changed or studied in the experiments. Such a method is manifestly very difficult with oils, fats or soaps which are mixtures of such similar materials very difficult to separate.

The recent investigators have, however, been able to use pure individual fatty acids for preparing their experimental soaps, so their results have a definite basis. Wherever possible, the conclusions are extended to embrace commercial soap mixtures.

The most common appearance of soap in solution is either a hot clear liquid or a stringy, usually white, gelatinous mass often approaching to or actually solid. The pure soaps used experimentally have the same general properties and the different solution states have been quite clearly described,[2] although there are no very definite boundaries between them.

"Sols," "Gels" and "Curds"

A "soap sol" is a clear transparent liquid, but it usually contains a little sediment of solid soap, the result of the small but definite hydrolysis that is universally exhibited by all aqueous soap systems. Often at the lower temperatures the soap solution deposits the soap which is in excess of the solubility at the time.

A "soap gel" is a clear, transparent body which is identical with a "soap sol" in every respect except that it retains a definite form and possesses elasticity. Often the gel is clouded by the formation of a few true curd fibers.

A "soap curd" is a white, more or less opaque, mass. It consists of innumerable curd fibers, enmeshed in which is a soap gel or sol. The concentration of the gel or sol depends upon the temperature and upon the nature of the soap, varying from very high concentrations to practically pure water, the latter being the case with the more insoluble soaps of the highest saturated fatty acids.

Finally, in the case of potassium soaps there may coexist with one or more of the above systems transparent tubular crystals of hydrated potassium soap.

The above relationship has not hitherto been recognized nor described.[2]

When Soap Is Cooled

When ordinary soap is dissolved by heating in water, the result at any usual strength is a fairly clear solution or soap sol. As such a solution cools it sets to a solid gel, or tends to become "stringy," the soap frequently settling out from a clear liquid. If very dilute, however, the whole may remain as a clear liquid, a true solution of, say, sodium stearate, similar in all its properties to an equivalent solution of sodium acetate, which is not at all colloidal.

Fischer has devoted special attention to the cooling of soap solutions. When a soap sets to a *solid* on cooling, it has taken up or absorbed all the available water in the system. When there is a separation of soap within a clear aqueous liquid, the soap has absorbed only a limited amount of the water and the relative quantity is spoken of as the gelation capacity.

Three common fatty acids differ only by steps of two hydrogen atoms, but the amounts of water held per gram of dry soap vary in quite a different way:

Linolic (H_{31})	3.31 grams
Oleic (H_{33})	3.28 grams
Stearic (H_{35})	88.00 grams

The last two are the more frequently used in textile work and are approximately represented by red oil and pure tallow soaps. The same thing can be expressed in the more practical way of per cent of soap required to yield the same colloidal system:

Linolic	23.20 per cent
Oleic	23.30 per cent
Stearic	1.12 per cent

The figures show at once that the two most common types are quite different and imply that it would be possible to use only one-twentieth as much of one as of the other. Such, of course, is not the case even with pure soaps, as other factors intervene when it comes to actual scouring. Of practical soaps, those nearest to oleic acid always contain some of the harder fats and those nearest to stearic contain lower fatty acids closely related to it,

[1] Fischer. "Soaps and Proteins." Wiley, 1921.

[2] Darke, McBain and Salmon. Proceedings of the Royal Society. March 3, 1921. "The Ultramicroscopic Structure of Soaps."

as well as some oleic acid. They not only would come closer together in the amounts required, if used for the same purpose, but practice as well as theory tells us that such soaps are best adapted to somewhat different uses. That stearic acid soaps are not so *especially* efficient is also confirmed by the fact that stearic acid alone does not make particularly good soap, and is not used as such, although it can be conveniently bought and can be made up as easily as red oil soap, which is widely used for scouring.

Since commercial soaps are mixtures, the next logical step was the testing of such mixtures, starting with those that could be accurately controlled in composition. As stearates alone hold relatively very much more water than oleates, the question naturally arose as to what would happen if equal amounts of two such soaps were to compete for a limited amount of water. This is of special interest, as it is just what happens when a commercial soap is dissolved.

Omitting experimental details, sodium stearate cooled from the boiling temperature turns solid; sodium oleate under the same conditions is a mobile liquid: but if oleic acid soap is added to stearic acid soap the effect is out of proportion to the amount added, and only thin mixtures result where a more solid state would be expected. Similar results were obtained with oleate added to palmitate and in other cases.

Finally, soaps representing mixtures of the lower molecular weight, eight carbon caprylic acid with the eighteen carbon stearic, both saturated acids, were included in the series and a similar result found, which, expressed as a general conclusion, is, "It is the soap with the lower absolute gelation capacity which gives the deciding character to the mixture."

Expressed in more practical terms, the naturally occurring fats of lower molecular weight and of the unsaturated series, present in a fat like tallow, tend to make a soap manufactured from it depart considerable from the characteristics of a soap made of pure stearic acid, and the soap will make thinner solutions than would be expected from the behavior of sodium stearate alone.

Soaps as Emulsions

While these phenomena may seem to have been allotted an undue amount of space, they lead directly to one of the most striking of the newer conceptions; namely, that soap solutions usually behave like water dissolved in soap, suspended in a solution of soap dissolved in water. This is most easily illustrated by the familiar behavior of ether in ordinary extractions of aqueous solutions. Water will dissolve some of the ether, while the ether will dissolve a little water. The two solutions will be quite different in properties, although consisting of the same ingredients. Another closely analogous case is that of phenol and water.

Fischer suggests that something very similar takes place with soap and water. Water will dissolve a certain amount of each kind of soap at the boil and form an ordinary appearing clear solution. This is a solution of soap in water. If this cools and sets to a solid mass, it seems to approach more to the state of a solution of water in soap. At intermediate temperatures and strengths of solutions we have various mixtures of solvated soap in soap-in-water solution. It is the same thing that has been suggested for albumen. The apparent solution of albumen in water is really a complicated system consisting of a suspension of water in albumen or a hydrated albumen, in a weaker solution of albumen in water. Such a soap "structure" is in itself a sort of emulsion, and the two phases do not have just the same properties, as shown, for example, by their action on indicators.

Peculiarities with Indicators

The approach to the study of the more minute structure of soap solutions can be conveniently made through their reactions to indicators. A neutral soap is one in which the fatty acid is exactly neutralized by the alkali, and without a surplus of any alkaline salt. When a neutral soap is produced by the combination of exact equivalents of pure fatty acid and standard alkali it may be either acid, neutral or alkaline to such an indicator as phenolphthalein, depending upon the concentration of the water in the system.[1]

Take as an example pure sodium oleate, which is the nearest pure material to red oil soap. A chemically normal solution is practically 30 per cent strength. Phenolphthalein added to such a concentrated solution remains colorless, but as soon as water is added it begins to turn pink, and with increasing dilution becomes bright red. Again, if phenolphthalein is applied to the freshly cut surface of a solid gel of sodium stearate, the framework of the gel, which is the water-in-soap portion of the system, remains uncolored, while the contents of this framework, the soap-in-water portion, turn bright red. A drop of phenolphthalein solution placed on a 10 per cent sodium stearate-water gel remains uncolored. If, however, the gel is slightly squeezed to break the encircling fibers and bring out the enclosed sol, the spot turns bright red. A cold concentrated soap solution that does not turn pink with phenolphthalein becomes colored on warming. While the ordinary explanation would be that hydrolysis is increased, it is equally true that there is a change from water-in-soap to soap-in-water. If free fatty acid is added to a normal sodium oleate the mixture remains colorless on the addition of phenolphthalein, *but* when water is added it gradually gets pink and finally bright red. It is obviously not possible in soap analysis to draw very definite deductions from the addition of indicators to aqueous soap solutions.

The alkaline reactions are explained as due to the ordinary type of hydrolysis. The splitting up of soap in solution to form a trace of free alkali is the result of a very slight tendency to go back to its original raw materials and would be represented by

$$C_{17}H_{35}COONa + HOH = NaOH + C_{17}H_{35}COOH$$

(soap + water = caustic + fatty acid)

similar to the behavior of acetate of soda. The strength

of the caustic shown in this equation, even though very slight, is sufficient to prevent an equivalent of fatty acid being present at the same time, and the equation is not entirely true. Instead of a fatty acid we get an acid soap somewhere between the original neutral soap and $NaHP_2$, where P represents the fatty acid radical.[3]

"Ionic Micelle"

A salt like sodium acetate would have a certain electrical conductivity in solution, and while soap would theoretically exhibit a much lower value, actually its conductivity is quite comparable, and that has led to the conception that the acid soaps consist of "ionic micelle," particles built up of molecules and parts of molecules but varying in actual constitution with each temperature or strength of solution and each addition of any sort to it. In other words, the acid soaps are not true salts, but represent parts of colloidal electrolytes.

Such colloidal electrolytes are salts in which an ion has been replaced by a heavily hydrated polyvalent micelle that carries an equivalent sum total of electrical charges and conducts electricity just as well or even better than the simple ions that it replaces.[4]

The high conductivity is not explained by the hydroxyl ions, whose concentration is seldom much above N/1000, but must necessarily be due to the soap itself. With soap solutions of higher concentration it has been found that the undissociated substance is an ordinary colloid, while the organic ion is a micelle that maintains the conductivity. As solutions become more dilute, a gradual transition takes place from colloid to crystalloid, or from the colloidal type of electrolyte to the true solution type like sodium acetate, with simple ions.

Recent Observations

The exact connection between the individual constituents of soap solutions and their use as detergents has not yet been fully established, but some extremely interesting observations have been presented[2, 3, 4] and more work is promised. Some parts of the soap act as protective colloids to keep dirt in suspension or emulsion, while some form parts of the gel and curd structures.

That soap solutions must have some rather definite form of structure can be easily seen from a crude experiment. As performed by the present writer, a number of gallons of approximately 2 per cent Ivory soap were prepared and allowed to cool and stand for several days. When finally examined, it was a stringy, almost gelatinous mass. Suspended in it, however, were myriads of small white spherical bodies of perhaps a millimeter in diameter, some of which were arranged in the form of very definite chains. Under the microscope each sphere was found to radiate innumerable fine filaments. The soap mass had to a certain extent separated from a liquid that was nearly as clear as water and did not appear to contain any appreciable amount of soap. It was, however, distinctly alkaline, and yielded a large precipitate of soap curds on the addition of salt.

The remarkable work of McBain and his co-workers goes far beyond the units that we can see, and was, in fact, very largely performed under the ultramicroscope. It establishes quite conclusively that there are definite, systematic arrangements of molecules and colloidal groups.

Motion in Soap Solutions

Motion is the "without which nothing" in the use of soap, but the scrubbing board and the dolly washer provide only one important part of it. The other, equally important, is the Brownian motion of particles of soap, dirt and oils in suspension in water. Any particle of matter surrounded by a liquid is subjected to constant bombardment by its molecules. If the particle is large, no impression is made upon it, but if small enough it is affected, and since the molecular forces are usually not balanced, the particle is driven hither and thither and kept an active motion. On main purpose of soap is to help maintain this motion and hold the dirt in suspension until it passes to the sewer.

Among the constituents of soap solutions, several show Brownian motion. One kind of particle that is a product of hydrolysis is always observed in soap sols, gels and curds.[2] This type varies in size, comprising particles visible to the naked eye down to those of very low ultramicroscopic dimensions. These are merely a solid product of hydrolysis which is regulated entirely by the low OH ion concentration in these soap systems and is, in a sense, an unessential part of the solution.

Brownian movement is exhibited by two other constituents of soap solutions. It is shown by portions of curd fibers that are not attached to any solid body, as to a network of other such fibers. More important, however, are the innumerable milky white particles which appear to be present in all soap systems, usually just below the highest powers of visibility. It is probable that these, like the curd fibers, consist of neutral, undissociated soap colloid.

Soap Curds Are Fibers

Curds form from cooling or from salting out soap solutions. Their distinctive characteristic is that the curds, including those from palmitic and stearic acids, are composed of a felt of fibers which may be centimeters or inches in length, but usually of ultramicroscopic diameter. Some apparent fibers are even visible to the naked eye, but these are bundles of the much finer ones.

On cooling, or on addition of various substances to soap solutions, there are formed not only the white, opaque curds but, to quote McBain[3], "We are tending

[3] One of the best recent discussions on the nature and properties of soap solutions is found in the Third Report on Colloid Chemistry of the B. A. A. S. 1920.

[4] McBain and Salmon. J. A. C. S., 42, 426 (1920). "Soap Solutions and Their Constitution."

toward the opinion that in a *gel* there exist well-developed strings of long molecules forming an exceedingly fine filamentous structure which accounts for the elasticity of gels and also for the fact that they exhibit more or less clearly oriented properties. These strings of molecules which we contemplate may be microns or millimeters long; in other words, they consist of innumerable molecules placed lengthwise, and their formation would, of course, be ascribed to residual affinity. The strong tendency of soaps to form such structures is proven by the manner in which they form filamentous and fibrous curds. . . . In one undoubted instance, we observed and photographed a cloudy gel of sodium oleate which, in addition to curd fibers, contained an exceedingly fine and delicate filamentous network."

Returning to curds, the structure is known more definitely and the study has even employed the versatile "movies." Structures too fine for observation in the ordinary microscope have thus been photographed and thrown on a screen to show their life history from formation to disappearance. Soap curds consist invariably of fine fibers. "In the case of all sodium soaps these may be many centimeters in length, and may be straight or characteristically curled, but they are never of greater thickness than about one micron; that is, not above 1/100 millimeter."

While these curd fibers represent the only mechanical structural element of sodium soap curds, a curd really ". . . consists of a felt of fibers in which is enmeshed an aqueous liquid containing, according to the temperature, traces of soap and alkali, the product of hydrolysis, or perhaps large amounts of soap or gel depending upon age, previous history and, of course, temperature."

A Characteristic Case

The behavior of a sodium palmitate solution will summarize some of the main points. At 100 deg. Cent. sodium palmitate is extremely soluble, and while dilute solutions are partly true or crystalloidal, concentrated solutions consist chiefly of neutral colloidal sodium palmitate, together with sodium ion and colloidal ionic micelle, which contain part of the neutral colloid. Where the pure palmitate has a molecular weight of 255 the micelle has a value of possibly 3,000. Here practically all the soap is in the colloidal state, with perhaps half of it in the form of neutral colloid.

On cooling below 70 deg. Cent., definite orientation of the colloid in the sol becomes so pronounced that the fibers begin to appear. Separation increases as temperature is lowered, at the expense of the other forms of soap, until 0 deg. is reached, where sodium palmitate is very insoluble. Here it separates from solution practically quantitatively in the form of heavily hydrated curd fibers leaving behind nearly pure water.

The same description applies to all soda soaps except that some, like the stearate, are more insoluble than the palmitate, while others, like the oleate, are more soluble.

The potassium soaps are somewhat different. Soaps of the ordinary saturated fatty acids are more soluble. Instead of long rigid curds, theirs are much shorter, only a fraction of a millimeter in length.

While the action of the individual kinds of colloidal particles may not yet be definitely assignable to their proper places, for example, in an analysis of the scouring operation, evidence has been presented to indicate that they must have definite functions.

(*To be continued.*)

DEVELOPERS FOR PARA RED

A note in the Bulletin of the Mulhouse Society says that solutions of diazotized para-nitraniline containing an excess of mineral acid give pale yellowish shades. To obtain rich and bluer shades, the free acid must be neutralized with an excess of sodium acetate. A satisfactory and cheaper process consists of replacing part of the sodium acetate by its equivalent of sodium carbonate, in quantity just insufficient completely to neutralize the mineral acid. For the preparation of printing pastes containing diazotized para-nitraniline it is preferable to replace all the sodium acetate by its equivalent of caustic soda. Binder reports favorably on the process, although slightly inferior shades are obtained than when sodium acetate is used alone. When sodium phosphate, calcium carbonate or magnesium carbonate is used in place of sodium carbonate, still less satisfactory results are obtained. In a process communicated by C. Sunder the diazo solution contains 2,760 grams of para-nitraniline, 1,500 grams of sodium nitrite, 10,600 grams of hydrochloric acid of 10 deg. Be. and 361 grams of calcium acetate solution of 15 deg. Be. per 120 liters.

SCOURING OF COTTON FABRICS

At a recent meeting of the Manchester Section of the Society of Dyers and Colourists, J. Huebner read a paper on the effect of scouring and bleaching upon the structure and strength of cotton fabrics. He described the results of a large number of tests which have been carried out in order to ascertain the effect of different methods of boiling and of bleaching upon the tensile strain, the elongation, the ripping strain, and other properties of cotton fabrics. He stated that a very thorough cleansing and bleaching of a fabric should not materially reduce its tensile strain. The ripping strain was also little affected by the scouring, but was more appreciably affected by the bleaching operation. He pointed out that both the tensile and the ripping test provided useful information, and that the tensile test alone did not give a complete record of the changes which occurred in a fabric during scouring and bleaching. Attention was also drawn by the lecturer to the fact that the results obtained in scouring and bleaching were considerably influenced by the structure of the yarn and of the fabric.

The Control of Bleach-House Processes

IV.—The Strength of Stock Soap Solutions*

Difficulty of Gauging Weight of Soap Being Used in Bleaching—Simple Method of Exercising Control—Preparation and Use of Gauge Stick

By H. W. EASTMAN

IN many bleach houses it has long been the custom to work by "rule of thumb," and because a process has for years been carried out according to certain set lines the procedure is still adhered to at the present time, no thought or attention apparently being given as to whether such process could be simplified or improved or so controlled that proper manipulation of same would result in a better product and give assurance that satisfactory results could readily be duplicated.

Depth in Inches	Pounds of Soap
24	0
23	4⅔
22	9
21	14
20	19
19	23
18	28
17	33
16	37
15	42
14	47
13	51
12	56
11	60
10	65
9	70
8	74
7	79
6	84
5	88
4	93
3	98
2	102
1	107
0	112

Gauge stick for determining weight of soap to be added to depleted stock solution

In presenting this short article it is the intention of the writer to outline a method for a more accurate control of soap used in the bleach house.

Manipulation of Soap Bath

In the majority of the operations in a bleach house, where soap is employed, the latter is used only after it has first been thoroughly dissolved in hot water.

It is customary to have a stock tank of dissolved soap constantly at hand, but unfortunately, in the majority of cases which have come to the writer's attention, the strength of the stock liquor is not known, and consequently it is impossible accurately to gauge the number of pounds of soap being used in the different steps of the bleaching operation.

An accurate control of the soap consumption can easily be inaugurated by the following simple procedure:

1. Ascertain the capacity, in gallons, of the tank used for containing the soap solution.

2. Measure the depth of liquor in the tank, when same is conveniently full, and prepare a gauge stick showing depth, the total depth being divided into inches.

Illustration: Assuming that a rectangular tank measuring 72 inches in length and 36 inches in width is filled to a depth of 24 inches, then

$$72 \times 36 \times 24 \div 231 = 269.3 \text{ gallons}$$

Mark off twenty-four 1-inch divisions on the gauge stick, each inch thus representing

$$269.3 \div 24 = 11.2 \text{ gallons}$$

A 5 per cent soap liquor is easily prepared and makes a convenient strength of stock liquor.

If it is desired to fill the tank to the full depth of 24 inches, or 269.3 gallons, with a 5 per cent soap solution, then approximately 112 pounds of soap would be required according to the following calculation:

100 gallons of water = 830 pounds

100 gallons 5 per cent soap contains:

8.3 pounds × 5 = 41.50 pounds

2.693 pounds × 41.5 = 111.76 pounds

Therefore, each inch division on the gauge stock represents:

$$111.76 \div 24 = 4.66 \text{ pounds soap}$$

Place 112 pounds of soap in the stock tank, add sufficient water to cover same, turn on steam and heat until

*Previous papers of this series will be found in The Reporter for September, October and November, 1921.

thoroughly dissolved. Then add water up to the 24-inch division on the gauge stick, and mix thoroughly.

Assuming that the tank, properly prepared as above, has had soap solution used from it during the day's run, so that the height of liquor in the tank indicates 18 inches, and it is desired to replenish the tank to the 24-inch division—

Read off from the gauge stick at 18 inches the required weight of soap—i. e., 28 pounds. Add 28 pounds of soap to the stock tank and heat until dissolved, then dilute to 24-inch division with water, and mix thoroughly.

Of course, if the stock tank were kept for indefinite periods of time, at a high temperature, there would, of necessity, be a loss of water due to evaporation, and the stock soap solution would become concentrated and the strength unreliable.

If, however, the tank is only warm enough to keep soap in solution, the loss of water due to evaporation is negligible for practical purposes.

The solution must be heated by a steam coil in the bottom of the tank and not by an open steam pipe, as in the latter case the condensed steam would serve to dilute the stock soap liquor.

The above method has been found to yield excellent results, under practical working conditions.

The gauge stick can be so graduated as to show the number of pounds of soap required for each inch in depth, as is shown in the accompanying illustration.

Things Every Textile Chemist and Colorist Should Know

[*Note—Under this heading will be introduced as a more or less regular feature the discussion of various fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.*]

Erratum—Under this heading in the last issue, "Two Types of Bleaching: Oxidation and Reduction," sodium peroxide was represented as Na_2C_2 *through a typographical error. This should read* Na_2O_2.

No. 3
Hygroscopic Moisture, Per Cent Moisture Content, and Per Cent Regain

ALL textile fibers which are under direct atmospheric exposure contain moisture. The percentage present may vary greatly depending upon the relative humidity of the atmosphere, i. e., the ratio of the quantity of water vapor actually present in a given volume of the atmosphere to the quantity which would be required to saturate the same volume of atmosphere at the existing temperature. In other words, the greater the quantity of moisture present in the air to which textile fibers are exposed the higher the per cent of moisture content.

The normal moisture present in textile material is of a hygroscopic nature and this explains why the percentage may vary to such an extent.

By hygroscopic moisture we mean water that is not chemically combined as an actual constituent of the main substance of any material, but mechanically held in its pores; hygroscopic substances being at least microscopically porous. A hygroscopic substance, when placed in a very dry atmosphere, will gradually give up its moisture, and if heated for any length of time to a temperature just above the boiling point of water, the hygroscopic moisture will be entirely driven off. It is therefore possible to determine with considerable accuracy the percentage of hygroscopic moisture in any substance by carefully noting the loss of weight when it is heated to constant weight at a temperature of from 212 to 220 deg. Fahr. (100 to 104 deg. Cent.).

A distinction is made between "percentage moisture" and "percentage regain." For example, if a ten-gram skein of yarn is heated in an oven at a temperature just over 100 deg. Cent until it comes to a constant weight (sometimes called "bone-dry weight") and it is found to weigh nine grams, it is said to have contained 10 per cent of hygroscopic moisture. If this same skein is then placed in the ordinary atmosphere it will rapidly absorb moisture and if the air is sufficiently moist it will, after a few hours, regain its original weight. If when it comes to constant weight in any particular atmosphere it should weigh exactly ten grams the "regain" would be one gram or 11.11 per cent. This difference in percentage hygroscopic moisture and percentage regain is due to the fact that the former is calculated on original weight while the latter is based on bone-dry weight.

According to W. D. Hartshorne, the regain of wool in the form of worsted tops may vary from 10.4 per cent at temperature of 100 deg. Fahr. and a percentage humidity of 40 to 27.1 per cent at a temperature of 50 deg. Fahr. and percentage humidity of 100.

The percentage moisture content of the three common fibers—cotton, silk and wool—is found to vary about as follows at a temperature of 75 deg. Fahr.:

Per Cent Relative Humidity	Cotton	Silk	Wool
30	4.0	6.0	9.0
50	5.5	9.0	12.5
70	8.0	11.5	16.0
99	13.5	18.5	23.0

The term "condition" is frequently used to express the relative percentage of hygroscopic moisture in textile material and the term "conditioning" is used both to designate the process of determining the moisture content and in reference to the process of imparting to textile material a certain desired quantity of moisture.

In recent years the moisture content of textile fibers has become a very important factor in many manufacturing and finishing processes, and the attainment of the best results is often found to depend to no little degree upon its control.

The Chemical Constituents of Raw Cotton

By ROBERT GEORGE FARGHER, D.Sc., and JOHN CHARLES WITHERS, Ph.D.

The British Cotton Industry Research Association

[Note—Figures in parentheses refer to Bibliography on p. 120.]

I. Historical Introduction

Although no systematic examination of the constituents of raw cotton would appear to have been undertaken prior to 1860, the presence and importance of constituents other than cellulose had been recognized even to the extent of controversy.

A. Penot (1), in an article on bleaching, included in the substances to be removed, resinous matter natural to the filaments, the pigment of the plant, a fat, a "cupreous" soap, and a calcareous soap, and gave short accounts of the existing knowledge of these materials; whilst Persoz (2) noted the presence of (*a*) a coloring matter, (*b*) a "peculiar resin," insoluble in water and not readily soluble in alkalis, to which he attributed the role of a reserve and "protector" of the coloring matter from the action of decolorizing agents (*c*) fatty matter, and (*d*) inorganic salts.

The question had also attracted the attention of the French Academy of Sciences (3), where there was prolonged discussion as to whether cellulose existed in one or more forms. Fremy held that more than one existed, basing his argument on the differing behavior of cellulose from various sources towards Schweitzer's reagent, and introduced the term *para-cellulose* to cover the more difficultly soluble forms; whilst Payen considered this difference apparent rather than real and attributable to incrustation with gum and other foreign matters. He thought that a layer of infinitely small bubbles of air condensed on the surface might to a lesser extent exert the same effect. Some thirty years earlier, he had shown that the epidermis of plants was covered with a very thin envelope containing fatty matter, some nitrogen, and silica. His experiments had been extended by Brongiart and by Mitscherlich, the latter supposing the covering medium to be a slender coating of "suberic matter," "a suberic material capable of yielding suberic acid and also succinic and nitric acids," to which coating he ascribed the difficulty of "wetting" fresh cotton. Fremy recognized in this coating all the characteristics of a fatty substance, "cutin," which, on saponification, yielded a substance with the properties of a fatty acid.

The first systematic investigation was reported to the Manchester Literary and Philosophical Society on February 4, 1868, by Schunck (4), who boiled two samples of cotton yarn (East Indian, variety "Dhollerah," and middling Orleans), with sodium carbonate in an open kier, and examined the flocculent precipitates obtained on acidifying the dark brown liquors with sulphuric acid. These amounted to 0.34 and 0.48 per cent of the cotton respectively and yielded (*a*) a substance designated "cotton wax," the analyses of which are in fair agreement with an alcohol $C_{24}H_{49}OH$; (*b*) margaric acid (a eutectic mixture of palmitic and stearic acids); (*c*) two "coloring matters," one freely and the other sparingly soluble in alcohol, the composition indicating rather a mixture of partially hydrolyzed proteins; (*d*) pectic acid; and (*e*) albuminous matter. By fusion of the crude extractive matter with sodium hydroxide, he isolated a substance closely resembling tyrosine, whilst incineration yielded 2.3 – 6.9 per cent of ash, consisting chiefly of the oxides of iron and aluminium, aluminium silicate, calcium sulphate, and sodium sulphate.

II. General Differentiation

The first attempt to figure the cotton hair is generally attributed to Thomson (5) in 1834. Crum (6), in a series of communications dealing with dead cotton and with the manner in which cotton unites with coloring matters, depicted longitudinal and transverse sections of cotton hairs in various stages of maturity, and dealt with the effects of mercerization. The examination was facilitated by the employment of specimens dyed with madder on an aluminum mordant. His results discredited the earlier idea that the hair was a hollow tube filled with air and more or less collapsed, and replaced it by that of a hollow sheath enclosing a deposit of cellulose.

Very shortly afterwards O'Neill (7), by microscopical examination of the action of Schweitzer's reagent on the hair, approached very closely the modern conception. He considered that cotton exhibited (*a*) an external membrane distinct from the true cell wall or cellulose matter, (*b*) spiral vessels situated either in or outside the external membrane, (*c*) the true cell wall or cellulose, and (*d*) an inner medullary matter.

More recently, Haller (8) has described the microscopic appearance of the fiber and distinguished three parts—the *cuticle*, the *cell membrane*, and the *lumen*.

The *cuticle*, consisting of "cutinized cellulose," has a finely grained or fibrous structure, is insoluble in ordinary cellulose solvents but soluble in strong alkalis, and is resistant to boiling under pressure with lime or even with sodium hydroxide of 2 – 8 deg. Tw. It is, therefore, so Haller considers, very doubtful whether the "cutin" in the cuticle is a fat as suggested by Wiesner.

The *cell membrane*, consisting of almost pure cellulose, is more or less colored, the pigment being resistant towards common solvents, but destroyed by long contact with oxidizing agents. The membrane is soluble in ammoniacal copper hydroxide solution ("cuprammonium"), treatment with this reagent leaving the cuticle and inner skin hanging in shreds.

The *lumen* contains dried protoplasm, which extends also into the adjacent layers of the membrane. The protein is rendered visible by staining with safranine, the hairs being steeped in a solution of the dye in dilute acetic acid, and then washed with water and boiling alcohol, when the reddened protoplasm can be distinguished under the microscope, especially if the dyed fiber has been treated first with "cuprammonium." Haller suggests that in mercerized cotton the cuticle is entirely lacking, and that in dyed unmercerized cotton the color is only absorbed on the surface, whilst on mercerization penetration occurs, this accounting for the deeper colors. In a later paper (9), he concludes that the outer membrane consists of two structural elements which show little difference under normal conditions but are readily differentiated when the cellulose is transformed into oxy- or hydrocellulose.

Levine (10), by chemical and bacteriological treatment, followed by microscopic examination, draws the conclusion that there are five structural elements involved—(*a*) the *outer layer or integument*, which is the encrusting layer and forms the cementing material of the fiber, being a mixture of cutinous, pectinous, gummy, fatty, and other components; (*b*) the *outer cellulose layer*, a distinct spiral comprising a limited number of components, perhaps one or two, and possibly consisting of impure cellulose; (*c*) the *secondary layer of deposits*, made up of components which in no case have a spiral structure and are five to ten in number; (*d*) the *wall of the lumen*, a spiral much the same as the outer layer, but differing in chemical composition; (*e*) the *lumen*, the substance of which is structureless and nitrogenous. The evidence on which the conclusions are based is not detailed.

A comparative study of the materials for making cellulose esters has led Noyer (11) to suggest that the cuticle consists of oxycellulose, which is porous, has great osmotic properties, and is not acted on by esterifying agents, but allows these to penetrate into the fibrils by osmosis. Konig and Rump (12) have dealt recently with the chemistry of vegetable cell membranes, dividing the difficultly soluble portions into three classes—*pentosans*, *hexosans*, and *lignins*. In each of these, one part, termed *proto-*, is rendered soluble by enzymes or by water at two to four atmospheres pressure. A second and larger part, termed *hemi-*, becomes soluble on boiling with 1 to 3 per cent acids at two to four atmospheres pressure, whilst a still larger portion, termed *ortho-*, is only dissolved by strong acids or by dilute acids under higher pressures. The *ortho-* group which includes cutin and suberin can be resolved further by treatment with weak oxidizing agents, the lignins undergoing oxidation and the orthocelluloses and cutin remaining.

Many excellent sketches made by the help of the Abbe appliance illustrating the structure of the cotton hair are to be found in a series of communications by Minajeff (13), in which the behavior of mercerized and non-mercerized cotton towards dyes is compared. The most recent contribution is that of Balls (14), who shows the existence of daily growth rings in the cellulose layer corresponding with the period of maturation of the fiber.

III. Proximate Analyses

Although hundreds of analyses of the whole cotton plant have been recorded by American agricultural chemists, few reports on the fiber itself have appeared. The following data by Church and Muller are quoted by many authorities, including J. M. Matthews (15), although their value, in the light of more recent work, is open to question:

	Sample I	Sample II	Surat.	Ameri-can	Egyp-tian
	%	%	%	%	%
Cellulose	91.15	91.35	91.35	91.00	90.80
Wax	0.51	0.40	0.40	0.35	0.42
Protoplasm, etc.	0.67	0.50	0.53	0.53	0.68
Ash	0.11	0.12	0.22	0.12	0.25
Water	7.56	7.00	7.50	8.00	7.85

Somewhat different figures are recorded, for example, in Bulletin No. 33 of the United States Department of Agriculture (16), which J. H. Barnes (16a) considers to be more representative:

Cellulose	83.71%
Ash	1.65%
Protein	1.50%
Fat	0.61%

A few determinations of some of the mineral constituents of carding waste have recently been published by H. D. Martion (17).

Analytical Methods—Two papers dealing with analytical methods may be mentioned here. In the first Barthelemy (18) describes the determination of water, ash, fats and waxes, pectic substances, lignose and cellulose in raw cotton. In the second, Schwalbe (19) outlines a scheme for the analytical investigation of vegetable fibrous materials, and proposes the determination of ash, moisture, fat, wax and resin, cellulose, furfuraldehyde, methylfurfuraldehyde and methoxyl group.

Roberts (20) has recently called attention to the fact that the inorganic constituents of a plant can only be determined accurately by extracting the plant itself with water and dilute acids. Part of the combined chlorine, for example, may be lost during ignition, whilst the amount of sulphate in the ash may exceed that originally present in the plant.

Detection of ligneous impurity—Woody material in cotton may be detected by reason of its greater affinity for malachite green (21), the color being retained after the addition of bleaching powder to decolorize the true cotton.

IV. Extraction with Solvents

The most complete reports on the amount of material removed by various solvents are those of Knecht and his collaborators (22, 23, 24, 25, 26). The following figures are typical:

	Cotton Sliver			Cotton Yarn	
	Egypt	Bengal	Texas	American	Egyptian
	%	%	%	%	%
Benzene	0.47	0.38	0.55	0.41	0.44
Alcohol	0.68	....	0.90	0.53	0.74
Water	1.46	....	1.61	1.66	1.51
Ammonia (1%)	0.48	....	0.39	0.43	0.50
Formic acid (1%)	0.46	....	0.72	0.65	0.41
Hydrochloric acid, cold dilute	....	....	0.43	0.66	0.54

By means of petroleum ether, Knecht has separated the benzene extract into two portions—*"cotton wax A"* and *"cotton wax B."* These are dealt with in the succeeding section, but it may be recorded that 72 per cent of the extract from Egyptian cotton and 80 per cent of that from American cotton dissolved in the petroleum.

Similar figures are given by Matthes and Streicher (27), who found that petroleum ether extracted 0.5 per cent from Caravonica cotton (from North Queensland), 0.36 per cent from Egyptian, and 0.34 per cent from American. The same cottons after bleaching yielded 0.25, 0.26, and 0.32 per cent respectively. Piest (28) extracted nine samples of cotton with ether, carbon tetrachloride and alcohol, and obtained small amounts of wax varying from 0.09 to 0.53 per cent, and Barnes (16) has found that ether extracts from 0.188 to 0.618 per cent from various Indian cottons. Knecht (25) has recently noted that one effect of destroying the fibrous structure of the extracted cotton mechanically is to release a further quantity of extractive matter.

The use of organic solvents on the large scale is mainly confined to the "degreasing" of cotton waste, for which benzene, petroleum, and chlorinated hydrocarbons have been employed. The pioneer work was carried out in this country by J. W. Mitchell (29), who originally tried carbon disulphide and benzene, but ultimately (29a) decided that benzene is the most satisfactory solvent. Goehrig (30), however, has applied such liquids to the cleansing of textile materials generally, and has described the necessary plant and precautions. Recently, the use of benzene in the removal of wax from linen has been protected (31, 31a).

Apart from the wax, little is known about the material extracted save that it appears to contain much mineral matter. In the case of the cotton yarns examined by Knecht (24), the alcoholic extracts were amorphous, brown, and hygroscopic. They reduced Fehling's solution, and the ashes contained respectively 17.9 and 23.4 per cent of K_2O. The water extracts were similar, but did not reduce Fehling's solution so readily. They contained respectively 50.4 and 54.5 per cent of mineral water.

Lester (32) has examined the aqueous extract of raw cotton, and gives the following figures for the extract: Ash 39.2 per cent, fatty acids 62.3 per cent, soluble in ether 17.5 per cent, soluble in cold water 39.5 per cent. The ash in the original cotton had been reduced from 0.82 to 0.21 per cent, whilst the cotton still contained 0.31 per cent of material soluble in ether.

Higgins (33) states that if cotton (or linen) is completely extracted with benzene, then treated with acid, washed and dried again, a further quantity of fatty acid, about 10 per cent of the first amount of wax, may be obtained by boiling with benzene. The acid washings contain magnesium, from which the conclusion is drawn that some of the fatty acid is present as a magnesium salt. Knecht also reports that after extracting cotton with benzene and then bleaching, a further, but smaller, extract can be obtained.

V. The Wax of Cotton

The only investigation of cotton wax which is more than cursory is that of Knecht and Allan (23), who

found that the benzene extract of raw cotton could be differentiated by means of petroleum ether into *"soluble cotton wax A"* and *"insoluble cotton wax B."* For the Egyptian cotton on which the main investigation was conducted the ratio was 72 per cent of the soluble wax to 29 per cent of the insoluble, whilst for an American cotton it was 80 to 20 per cent.

"Cotton wax A" is odorless, dull yellow in color, and closely resembles beeswax in texture and fracture. It has m.pt. 66 – 67 deg. Cent.; iodine value 28.55; acid number 44.1; and saponification value 84.3. About 18.8 per cent is undissolved by boiling 96 per cent alcohol. It is saponified with difficulty, but by using glycerol and sodium hydroxide it gives 47.5 per cent of unsaponifiable matter, consisting of (*a*) hydrocarbons [hentriacontane ($C_{31}H_{64}$) and dotriacontane ($C_{32}H_{66}$) were definitely isolated]; (*b*) a phytosterol, giving an acetyl derivative melting at 127 deg. Cent., but otherwise unidentified; and (*c*) fatty alcohols unidentified owing to lack of material. The soap yields palmitic, stearic, and cerotic acids.

"Cotton wax B" forms a dark green granular mass, with m.pt. 68 deg. Cent., acid number 4.03, and saponification number 83.3. The unsaponifiable portion yields 53.5 per cent of a reddish brown sticky wax melting at 63.6 deg. Cent., and giving on acetylation a considerable quantity of a phytosterol acetate with m.pt. 122.4 deg. Cent. The soap yields a small proportion of melissic acid.

Both Knecht and Piest (28) have ascribed reducing properties to cotton wax, as it appears to increase the "copper number" of cotton. The reducing agent may be similar to an aldehyde detected by Hoffmeister (24) in the wax of flax.

VI. The Ash of Cotton

According to Matthews (15), the ash of true cotton never exceeds 1 per cent, but Barnes (16) contends that this is incorrect. Twelve Indian cottons, he found, averaged 2.48 per cent, the extreme values being 1.34 and 3.99. The amounts of silica and chlorine present were in accord with the figures for total ash. Five samples of American cotton gave values ranging from 1.18 to 1.92, whilst two Egyptian samples gave 1.37 and 1.50 respectively. A two-ply 60 American cotton examined by Knecht (24) contained only 0.93 per cent, a similar Egyptian sample 1.17, and a soft twist Egyptian 0.89 per cent of ash.

In the above series of Indian cottons, the percentage of chlorine varied from 2.23 to 6.53, and the proportion of the ash insoluble in hydrochloric acid, ascribed to silica and silicates, from 4.44 to 28 per cent.

Two complete analyses of the ash are quoted by Barnes as follows:

	Bombay %	Punjaub %
Moisture in original fiber	2.23	3.78
Total ash in dry fiber	3.99	1.85
Constituents of the ash: SiO_2	15.56	14.40
Al_2O_3	10.80	12.87
Fe_2O_3	5.89	1.92
CaO	9.75	10.65
MgO	1.87	4.36
K_2O	27.32	26.03
Na_2O	4.51	8.40
SO_3	1.96	2.52
P_2O_5	3.26	4.46
CO_2	12.19	8.03
Cl	6.55	3.84
Undetermined:	0.34	2.52

Extraction with solvents effects at least partial removal of the mineral constituents. Thus in the experiments of Knecht already quoted (21) the alcoholic extracts of Egyptian and American cottons, from which the wax had previously been removed, consisted largely of mineral matter, chiefly K_2O, Na_2O, MgO, SO_3, CO_2 and P_2O_5. The ash of the former extract contained 23.4 per cent K_2O, and that of the latter 17.9. The succeeding water extracts contained respectively 54.5 and 50.4 per cent of mineral matter.

Lester (32) has compared the ash from the aqueous extract of cotton with that of the cotton itself. The latter contained 0.82 per cent, and 0.61 per cent was removed by the extraction. The constituents were as follows:

	Ash of Water Extract %	Ash of Cotton %
Magnesium carbonate	6.84	5.11
Magnesium phosphate	2.65	13.10
Alumina	3.90	3.90
Iron oxide	trace	2.71
Silica	1.75	1.00
Calcium carbonate	3.80	13.50
Sodium carbonate	27.78	15.90
Potassium carbonate	13.82	.....
Potassium sulphate	36.90	32.20
Potassium chloride	2.60	2.50
Sodium sulphate	....	4.60

Lester considers the "hygroscopic" properties of cotton to be due to some extent to the material extracted by water. Crace Calvert (35) found that nearly the whole of the phosphorus was removed by cold water extraction, and determined the phosphate content of a number of cottons. The percentage of soluble phosphate, calculated as P_2O_5, are as follows: Egypt, 0.055 per cent; New Orleans, 0.049 per cent; Bengal, 0.055 per cent; Surat, 0.027 per cent; Carthagena, 0.035 per cent; Macao, 0.050 per cent; Cyprus, 0.050 per cent.

When a sample of lint is burned, the skeletal structure is preserved in the ash, which suggests that the mineral substances are present in the tissue of the fiber itself rather than as dried-up cell sap. The latter point is

borne out by a consideration of the Indian cottons referred to in the foregoing analyses. The Punjaub sample is grown in very saline soil, is two months longer in the ground than the Bombay crop, and the district is one of the driest in India, yet the fiber contains more moisture and less ash than the Bombay sample. It is noteworthy also that the sample with the larger proportion of ash has the larger amount of carbonate in the ash, and presumably, therefore, a larger proportion of its inorganic constituents in the form of salts of organic acids. The absorptive power of cellulose has also been advanced to account for the fixation of some of the mineral constituents.

Balls (36) has determined the specific salinity of the cell sap of pure strains of Egyptian cotton, and finds a salt content which varies not only with the salinity of the soil but also with the variety employed. Plants of two Egyptian strains growing with interlacing root systems showed differences of as much as 10:7 in the salinity of their cell sap.

(To be concluded.)

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(To be concluded.)

DR. CHARLES BASKERVILLE

Dr. Charles Baskerville, director of chemical laboratories of the College of the City of New York, died of pneumonia on Saturday, January 28, at his home, 610 West One Hundred and Tenth Street, New York, in his fifty-second year. Dr. Baskerville was the author of a number of textbooks on chemistry and contributed many scientific articles. His researches embraced work on rare elements, on anesthetics and on many phases of industrial chemistry.

He was born in Noxubee County, Mississippi, June 18, 1870. He studied at the University of Mississippi in 1886 and 1887 and was graduated from the University of Virginia in 1890. He attended Vanderbilt University in 1891, the University of Berlin in 1893 and received the degree Ph.D. from the University of North Carolina in 1894. From 1891 to 1904 he was connected with the chemistry staff of the University of North Carolina as instructor, assistant professor and professor of chemistry and director of the chemical laboratory.

In 1904 he was called to the Chair of Chemistry at the College of the City of New York. He designed the large laboratory of that institution and served as professor of chemistry and director of the laboratories up to the time of his death.

He was a member and Councillor of the American Chemical Society, a Fellow of the American Association for the Advancement of Science, a Fellow of the Chemical Society, London, a member of the Society of Chemical Industry, the American Electrochemical Society, the New York Academy of Sciences, the Franklin Institute, Phi Beta Kappa Society and the Delta Kappa Epsilon Fraternity. His clubs were the Century, Engineers, Chemists', Graduate, City College, Colonado, Southern and Authors'.

The Liberty Chemical Company, 324 West Avenue, Pawtucket, R. I., has filed notice of organization. E. A. l'Heureux is head of the company.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Elmer C. Bertolet William K. Robbins
Arthur E. Hirst Walter M. Scott

SECOND RESEARCH COMMITTEE MEETING

(Concluded from last issue.)

It was considered desirable, wherever possible, to have a range of type colors sufficiently extensive so that unknown reds, yellows, greens, etc., could be compared against correspondingly colored type dyes.

It is the desire of the Council to eventually standardize all colors in order that each can occupy a proper place in our classification; and while this will extend over a long period of time, it will eventually be of great value.

The chairman designated the following as members of a special committee to formulate provisional plans for the determination of methods for fastness to washing on cotton:

James L. Amsden, Chairman;
William K. Robbins,
George A. Moran,
A. E. Hirst,
William H. Cady.

It was decided that such materials as cotton shirtings would require an extreme degree of fastness, whereas ginghams would not require such a high standard.

It was felt that after the Association had proceeded sufficiently with the type of work under consideration, the methods of fastness approved by us would be accepted as standard in all cases.

It was pointed out that material used as standard type would have to be processed in a certain definite manner, the procedure being known and closely followed in every particular.

In the matter of type colors, it was suggested that ten type colors would be a reasonable number to consider.

It was decided that it would be better to make our nomenclature at present numerical rather than a descriptive name showing the classification of the dye or fabric. Words such as excellent, good, fair, medium, etc., might be used by the general public, but dyers and textile chemists could use the numerical nomenclature to greater advantage.

A paper covering the bibliography of fastness has been prepared by W. J. Murray, and this will be published in a current issue of the American Dyestuff Reporter.

It was decided to hold the next meeting on Friday, February 10, 1922.

It was decided that the Special Committee meet at 8 o'clock on the day of the next Council meeting.

The meeting was then adjourned.

Respectfully submitted,
W. E. Hadley, Secretary.

RHODE ISLAND SECTION MEETING

The next meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists will be held at the rooms of the Providence Engineering Society, 29 Waterman Street, Providence, on Friday, February 17, at 8 p. m. Officers for the year will be elected.

Robert Spurr Weston, of the firm of Weston & Sampson, consulting engineers, of Boston, will give an illustrated talk on "Water Purification for Textile Purposes."

This is a topic in which many of our mills are vitally interested at the present time, and a large attendance is desired. Please give this notice as much publicity as possible at your plant.

Members of the Association are invited to be present at the meeting of the Rhode Island Section of the American Chemical Society, on Friday, February 24, at 8 p. m., at the Providence Engineering Society Rooms. Professor Louis A. Olney of the Lowell Textile School, President of our Association, will speak.

Henri N. F. Schaeffer,
Secretary Pro Tem.

ORGANIZATION MEETING OF NEW YORK SECTION

Pursuant to the action of the Council in approving the petition submitted for authority to form a local New York Section, the Secretary Pro Tem, E. H. Killheffer, sent the following letter to all of the members residing in New York and northern New Jersey:

Dear Sir—Please be advised that permission has been granted by the Council for the formation of a New York Section of the American Association of Textile Chemists and Colorists, to include principally the State of New York and northern New Jersey.

Will you please arrange to be in attendance at an organization meeting Friday evening, February 3, in Rumford Hall, Chemists' Club, 52 East Forty-first Street, New York City, at 8 o'clock?

Yours very truly,
(Signed) ELVIN H. KILLHEFFER,
Secretary Pro tem.

and caused to be published in the AMERICAN DYESTUFF REPORTER, the following paragraph above a copy of the letter:

"Under date of January 26, the following letter was mailed to all members of the Association living in New York and northern New Jersey. Any members who failed to receive a notice are invited to be present."

The meeting was called to order at 8.15 P. M., Friday, February 3, in Rumford Hall of the Chemists' Club, by the Secretary Pro Tem and nominations were asked for a temporary chairman to preside over the meeting. Motion was made, secondad and carried that the Secretary Pro Tem remain in the chair.

Nominations were requested for Secretary Pro Tem to record the meeting. Mr. Low was nominated and duly confirmed.

The question of regular place for meetings was taken up in open discussion and while no definite or direct action was taken the general sentiment expressed was as follows:

1. That Newark is undesirable because of general inaccessibility.

2. That either Passaic or Paterson would be appropriate as these cities are textile centers.

3. That New York was most convenient for all concerned.

The suggestion of alternating meetings between Passaic and New York was well met. No definite decision beyond that New York would be the meeting place for the present, was reached.

A motion was made that steps be taken to effect a permanent organization and that the chairman open nominations for officers. Seconded and carried.

Mr. Scott nominated Mr. Hadley, for permanent chairman, seconded by Dr. Harold. Mr. Hadley declined on the ground that he was already serving the organization in other capacities. Mr. Perlman nominated Mr. Killheffer. Mr. Killheffer declined on the ground that the first chairman would more properly be some one engaged in actual textile production. Mr. Unterweiser nominated Mr. Scott, seconded by Mr. Schaumann. Mr. Scott declined on the ground of locality.

Dr. Cathcart made the proposal that Chairman Pro Tem appoint a Committee of five of which the Chairman should be a member ex-officio to draw up a slate of proposed officers, ascertaining beforehand that the election would be acceptable to those nominated, to be presented and voted upon at a future meeting. The suggestion was reworded into the form of a motion, seconded and carried.

It was suggested that a program committee be also appointed to arrange for the next meeting. Dr. Cathcart amended his first motion to the effect that the program be also the duty of the Nominating Committee. The amendment was seconded and carried.

The Chair proceeded to appoint the following Committee:

E. H. Killheffer (chairman ex-officio)
Dr. W. R. Cathcart
F. J. Oesterle
W. E. Hadley
E. G. Quin

Chairman called for further business and the matter of financing the Section was discussed. Without direct motion it was decided to leave the arranging of this phase to the recently appointed Committee of five.

Discussion followed regarding places of meeting. The informal decision here also was to leave this matter to the Committee.

Motion was made to adjourn, seconded and carried.

Following is a list of those who attended:

Walter M. Scott, Elvin H. Killheffer, William R. Cathcart, L. C. Lewis, H. J. Daignault, E. G. Quin, William C. Dempster, Herbert Grandage, Giles Low, Jos. S. Unterweiser, Everett H. Hinckley, C. M. Edward Schroeder, J. F. X. Harold, Frank C. Holden, Chas. F. Schaumann, A. S. Helm, H. S. Busby, W. E. Hadley, S. Donald Perlman, Stanley Mayer, Edward Mayer, Frank J. Oesterle.

Respectfully submitted, February 4, 1922.

GILES LOW,
Secretary Pro Tem.

Proceedings of the American Association of Textile Chemists and Colorists

A BIBLIOGRAPHY OF LITERATURE ON THE FASTNESS OF DYES

By Wallace J. Murray
Contribution from the Laboratories of Arthur D Little, Inc.

Introduction

A search has been conducted through abstracts published in the Journal of the Society of Chemical Industry and Chemical Abstracts for articles on the definition and testing of the fastness of dyestuffs. These cover journal articles only.

The abstracts of the Society of Chemical Industry go back to 1882. These have been used from that date to 1907. "Chemical Abstracts" of the American Chemical Society were first issued in 1907 and have been used from that date to the present time. References have been found to journal articles which have not been abstracted in either of these journals. In these cases the information given in the table is incomplete, since the writer has been unable to obtain either the original articles or abstracts. A reference to an abstract in the English language is given wherever possible, since the original articles are often both difficult to obtain and in foreign languages.

A study of the journal literature gives a good idea of the development of the testing of dyestuffs. Many books have been published dealing with this subject. Almost all of the information in them is based on material previously published in the journals. For this reason it has not seemed desirable to give a full list of such books. Instead, only a few typical books will be mentioned.

The majority of the large color manufacturing firms have issued books on the colors which they produce. In most cases tests for fastness are included. Generally the method for carrying on these tests is specified, and the fastness indicated by a series of comparative numbers. Some firms make No. 1 the fastest and others make No. 1 the most fugitive.

There are a number of textbooks which deal with the testing of dye fastness. A list including a few typical examples will be found at the end of the journal bibliography.

Some of the large chemical dictionaries give articles on testing dyestuff fastness. A good example of an article of this type is in Ullmann's Enzyklopadie der Technischen Chemie (1907), Vol. 5, page 262. This gives a fairly good abstract of the tests adopted in 1914 by the Echtheits Kommission, and a small amount of explanatory matter.

BIBLIOGRAPHY OF JOURNAL ARTICLES ON DYE FASTNESS

Year	Journal and Date	Author	Title	Abstract
1888	Bull. Soc. Chem., 49, 860	I. Joffre	Fastness of Colouring Matters Fixed on Textile Fabrics	J. S. C. I., VII, 671
1890	Oest. Woll und Leiman Ind. 6, 288	P. Muller	Fastness to Light of Substantive Cotton Dyes	J. S. C. I., IX, 856
1891	Zeits f. Angew Chem. 7, 211-212	A. Woscher	The Fastness of Dyed Colours to Light and Air	J. S. C. I., X, 634
1891	J. Soc. Arts, 1891, 535-548	J. J. Hummel	Fast and Fugitive Dyes	J. S. C. I., X, 832
1891	J. Soc. Dyers & Col., 1891-82-84	T. Frusher	Permanent and Fugitive Colors to Light on Wool	J. S. C. I., X, 833
1891	Chem. Zeit. 15, 43 and 75	W. Evans	Fastness of Aniline Black	J. S. C. I., X, 541
1892	J. Soc. Ch. Ind., XI, 12	J. J. Hummel	Fast and Fugitive Dyes (discussion of J. Soc. Chem. Ind.), X, 832	J. S. C. I., XI, 12 Original
1894	J. Soc. Dyers & Col., 1894, 90	A. Duffon	The Fading of Colors	J. S. C. I., XIII, 633
1895	J. Rus. Phys. Ges., 1895, 27, 80	W. W. Oglobin	Fading of Colors on Cotton	J. S. C. I., XV, 32
1896	Chem. News, 74-205			.....
1896	Revue Chim. Ind., 1896, 7, 39-40	G. Dommergue	Fastness to Light and Street Mud of Colours on Wool	J. S. C. I., XV, 271
1897	Z. Angew Ch., 10-100	Kitchelt	Fastness	No. Abs.
1897	Farb. Ztg., 8, 138	Lehne	Fastness	No. Abs.
1898	Bul. Soc. Ind. Mulhouse, 1898, April-May, 119-123	A. Scheurer	Means of Measuring the Action of Light on Colors	J. S. C. I., XVII, 759
1898	Textile Record & J. Soc. Dyers & Col., 14 (8), 176-178	J. Herzfield	Testing the Fastness of a Dyestuff	J. S. C. I., XVII, 842
1898	Bul. Soc. Ind. Mulhouse, 1898, Aug.-Nov., 273-283	A. Scheurer A. Brylinski	Means of Measuring the Action of Light on Colors	J. S. C. I., XVIII, 137
1899	Bul. Soc. Ind. Mulhouse, 1899, 96-97	A. Scheurer A. Brylinski	Means of Measuring the Action of Light on Colors	J. S. C. I., XVIII, 580
1900	Oester Ch. Zeit., 3, 265	E. Valenta	Testing the Fastness to Light of Printing Colors	J. S. C. I., XIX, Ch. Centr., 1900, 2 (3), 223
1900	Bul. Soc. Ind. Mul., 1900, July-Aug., 207-208	P. Dosne	Method of Determining and Expressing the Fastness of Colors to Light	J. S. C. I., XIX, 1108
1902	Z. Farb. Ind., I, 656	G. v. Georgievics	How Should Dyes Be Tested for Fastness?	No Abs.
1903	5th Int. Cong. Ap. Chem., Berlin, Ber. II, 822, Farb. Zeit., 1903, 14 (15), 269-276	H. Lange	What Treatments Are to Be Regarded as Satisfactory in the Examination of Dyestuffs with Respect to Fastness?	J. S. C. I., XXII, 947

Proceedings of the American Association of Textile Chemists and Colorists

Year	Journal and Date	Author	Title	Abstract
1904	Leipziger Mon.-sh. f. Text. Ind., 19, 21 and 109	Kitschelt	Fastness of Dyed Wool to Light	No Abs.
1904	Farb. Zeit., 15, 373-377	E. Davidis	Fastness to Perspiration of Dyed Goods	J. S. C. I., XXIV, 85
1908	Rev. Gen. Mat. Col., 12, 289-292	A. Bolis	Researches on the Fastness of Dyestuffs to Light	J. S. C. I., XXVII, 1056
1908	Bul. Soc. Ind. Mul., 70-320	Scheurer Schoen and Wild	The Application of Actinometry as a Measure of Resistance of Colors to Light	C. A., 2-710
1909	Rev. Gen. Mat. Color, 13-73	Bechtel	Use of the Prussiates of Iron in Measuring the Fastness of Dyes to Light	C. A., 3, 2873
1909	Rev. Gen. Mat. Color, 12-288	F. Berga	Fastness of Indigo	C. A., 3, 1691
1909	Rev. Gen. Mat. Color, 12-289	A. Bolis	Fastness of Dyes to Light	C. A., 3, 1691
1910	Am. Silk J., 29-52	F. Dannerth	Dye Permanency	C. A., 4, 2734
1910	Rev. Gen. Mat. Col., 14-193	P. Dosne	Study of a Method of Determining the Fastness of Colors to Light	C. A., 5, 200
1910	Mul. Soc. Ind. Mul., 80-332	P. Dosne	Means of Estimating Qualitatively and Quantitatively the Degradation of a Color Exposed to Light	C. A., 5, 1998
1910	J. Soc. D. & C., 25, 276 and 304	K. Gebhard	The Action of Light Upon the Fastness of Dyestuffs	C. A., 4, 385
1910	Z. Angew. Ch., 22, 1890	K. Gebhard	The Action of Light on Dye Systems	C. A., 4, 1682
1910	J. Soc. Dy. Col., 26-173	K. Gebhard	Action of Light on Dyed Shades and Standard Method of Testing	C. A., 4, 3005
1910	Mitt. Kgl. Mat. pr. 1910, sup. No. 1, 1-18	P. Heermann	Testing Fastness to Washing of Washable Colors	C. A., 5, 3517, J. C. I., 30-20
1910	Text. Farb. Ztg., 7, 457	K. Immerheiser	Fastness of Coal Tar Colors	C. A., 4, 250
1910	Z. Agnew. Ch., 23, 1206	P. Krais	Sensibility of Coal Tar Colors to Light	V. A., 6, 155
1911	Elsassisches Textiblat. 1911, 257	E. Grandmougin	Fastness of Colors	.....
1911	Farb. Ztg., 22, 6 and 26	K. Gebhard	The Establishment of a Uniform Method for Testing the Light Fastness of Colors	C. A., 5, 1518
1911	Farb. Ztg., 22, 209	V. Klemperer	A Uniform Method for Testing Light Fastness	C. A., 5, 3626
1911	Chem. Ztg., 35-741	K. Gebhard	Uniform Testing Methods in the Textile Industry	C. A., 5, 3159
1911	Z. Angew. Ch., 24, 1302	P. Krais	Proposed Scale for Measuring the Action of Light on Dyes According to Bleach Hours	C. A., 6, 1068
1911	Farber-Ztg., 1911, 118	F. Eppendahl	The Question of Normals of Fastness	Z. Angew. Ch., 24-1294
1911	Z. Angew. Chem., 24, 1807	K. Gebhard	Criticism of P. Krais (same J., 24, 1302)	C. A., 6, 1069
1911	Z. Angew. Ch., 24, 1809	P. Krais	Defense of Above	.....
1911	Z. Angew. Ch., 24, 1856	K. Gebhard	Reply to Above	.....
1911	Z. Angew. Ch., 24, 2426, Ch. Ztg., 36-380	K. Gebhard	Measuring Action of Light on Dyes (criticism of Krais' method)	C. A., 6, 2317
1911	Bul. Soc. Ind. Mul., 80, 324-31	A. Scheurer	Exposure of Cotton Dyes to Sunlight and Under Mercury Arc	C. A., 5, 1998
1912	Technique Moderne, 4, 407	E. Grandmougin	Fastness	.....
1912	Farb. Ztg., 1912, 514	F. Eppendahl	Fastness to Washing and Its Testing	
1912	8th Int. Cong. Appl. Chem., 20-91	Bancroft, Elsenhart and Grant	Rapid Testing of Dyes and Pigments	C. A., 6, 3189
1912	Farb. Ztg., 23, 515-6	W. Kind	Testing Fastness to Weather at Different Seasons	C. A., 3543
1912	Z. Angew. Ch., 25-2193	P. Krais	Light Fastness of Pigments from Coal Tar Dyes	C. A., 7, 901
1913	J. Phys. Chem., 16-546	Bancroft, Elsenhart and Grant	Rapid Testing of Dyes and Pigments	C. A., 7, 2309
1913	Z. Angew. Ch., 26, 74	P. Krais	Light Fastness of Pigments from Coal Tar Dyes	C. A., 7, 1620
1913	Ztg. Angew. Ch., 26-79	K. Gebhard	Rapid Testing of Light Fastness of Dyes and Pigments	C. A., 7, 1613
1913	Z. Angew. Ch., 26-162	F. Eppendahl	The Movement for Fast Dyeings and the Dyeing of Fast Colors	C. A., 7, 1978
1914	Farb. Ztg., 25-45			
1914	Ch. Ztg., 25	A. Kertess	Testing Fabrics for Fastness to Wearing	.....
1914	Farb. Ztg., 24, 366-70	E. Konig	Influencing the Light Fastness of Dyeings	C. A., 8, 1674
1914	Z. Angew. Ch., 27, Aufsatz, 57-63, Chem. Ztg., 38-154		Official Report of German Committee on Fastness	C. A., 8, 1348 J.S.C.I., XXXIII, 248
1915	J. Soc. Ch. Ind., 34, 598-9	A. Sorker	Use of Knecht's Process for Determining Fastness to Light and Other Agencies	C. A., 9, 3364
1915	Trans. Am. Elect. Chem. Soc., 28-371, Chem. Eng., 22-111	W. R. Mott	Use of the Flaming Arc in Paint and Dye Testing	C. A., 9, 3130

40

(To be concluded.)

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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THE DYE INVESTIGATION

AFTER innumerable false starts which kept those interested more or less on the qui vive, the so-called dye lobby investigation of Senator King is at last apparently slated to get under way. At the present writing it has just been postponed for the third time, but will begin, according to present plans, Tuesday morning, February 14, at which time the hearing of witnesses by Senators Shortridge, Ernst and Reed, composing the investigating subcommittee of the Senate Judiciary Committee, will be commenced. How long the investigation is likely to last, or how deeply it may find itself required to delve into the legislative situation in order to gain the information desired by its instigator, there is no telling. But there is one development which may with confidence be depended upon to materialize, namely: that there will be connected with and involved in the investigation a certain element which will do all in its power to see that every possible disclosure, no matter how unimportant, shall be interpreted in the most sensational manner and blazoned broadcast.

This tendency has already been well shown by the tactics of Senator Moses on the day of passage of the King resolution. Toward the conclusion of a rather fiery speech in denunciation of the "dye monopoly," the New Hampshire Senator turned dramatically and pointed to a large chart which he had caused to be suspended from the Senate Gallery. This ingenious work had for its center an oval containing the name "DU PONT," which was surrounded by many squares and rectangles labeled "Chemical Foundation," "American Dyes Institute," etc. From the central oval there were lines radiating to the various smaller figures, and these themselves were joined to one another by additional lines which crossed and recrossed to form a perfect network.

It was the contention of Senator Moses that this chart showed the existence of a dye monopoly!

Although subsequently printed in the "Congressional Record" at the author's request, even the more sensational dailies engaged in supporting his activities did not see fit to reproduce it for the benefit of their many readers. It may possibly be that they regarded it as bordering too closely upon the libelous. Certain it is that it was viewed by many at that time as being somewhat childish, for it takes considerably more than the drawing of lines to establish such relationships as Senator Moses would have us believe they indicated. But it served a useful purpose in being, perhaps, as truly illustrative of the underlying motives and desires animating this investigation as anything well could be.

One well-known news agency stated in one of its reports that Department of Justice officials have intimated they may warn all prospective witnesses that anything they say may be used against them. And it is said that Senator King will ask for the calling of representatives of the American Dyes Institute, the Textile Alliance, the Chemical Foundation, the newly organized Synthetic Organic Chemical Manufacturers' Association, E. I. du Pont de Nemours & Co., and others. Perhaps the general attitude of the dye industry toward the investigation may be found summarized in communications recently sent to Senator Shortridge, chairman of the subcommittee. A telegram from Irenee du Pont, for instance, was as follows:

"Please say to your committee at its meeting to-day that the Du Pont Company is most anxious to appear and answer the charges made against it. All this company's acts in the campaign to have enacted legislation for the preservation of the new American dyes industry will bear the closest scrutiny. Our records are at your disposal, and any officials or employees whom you wish to hear are at your call. We urge that your investigation go deeply into all the activities undertaken to perpetuate a foreign monopoly in the sale of dyes in this country, as well as into the effort of American manufacturers to make this country chemically independent."

Again, there is the letter to Senator Shortridge from R. C. Jeffcott, president of the American Dyes Institute. This is also of interest as reflecting the sentiments of the industry. It states:

"In the investigation which your committee is about to begin under Senate Resolution No. 77, the American Dyes Institute and its members wish to let you know that they want to co-operate with you and facilitate your labors in every way. The resolution is comprehensive, and those engaged in the dye industry of the country welcome a most thorough and impartial examiation of all the questions covered by it.

"The members of the Institute are active business men, concerned with the affairs of their companies, but they want you to understand that they will be entirely at your disposal, and will without formal legal process of any character make themselves available to you, together with any records which you may desire

to be produced at any time that they may be given notice as to whom and what you desire."

Those are the sentiments of the industry, and they have not changed in the least since the King resolution was made the subject of a debate in the Senate. Moreover, if the investigation is prosecuted vigorously it may serve to reveal facts about the real condition of the industry which may surprise not a few of the opposers of protection. It should direct attention, for one thing, to the unhealthful intratrade competition which at present threatens to harm the industry almost as much as the three-year legislative delay. It should bring out strongly the fact that instead of a trust we have a well-nigh ruinous price war in the American dye industry. And, although this fact will be no real news to Senators King and Moses—nor to Representative Frear—it should at least have the effect of limiting their "monopoly" oratory in connection with this particular subject in future debates.

It would be interesting, indeed, to know the exact measure of Senator King's eagerness to make the investigation a searching one, as compared with his eagerness at the time when he presented his resolution. Certain it is that this eagerness has been reduced by at least whatever proportion of political scheming may have figured in his original desire. That proportion, were it high or low, was effectually wiped out when Senator Frelinghuysen shrewdly checkmated the King move by adding his amendment extending the scope of the investigation to the activities of importers and others working against the Longworth plan. Senator King would scarcely have dared withdraw his resolution at any time, much less at the last minute, and so was forced to watch it become a double-edged weapon quite as likely to cut into the King ranks, if wielded strenuously, as into the protection forces. The Senate having acted, an investigation of some kind must be held. But just how actively its instigators will now urge it forward is a question in the minds of many observers.

A press dispatch states: "An official who is prominent in the activities to expose alleged irregularities in disposing of alien property said the sale (of the 4,500 German patents) to the Chemical Foundation should be compared with the sale of the Bayer Company, of New York, which was sold to the Sterling Processes Company of Cleveland for $5,310,000. The estimated value of the machinery, plants and appurtenances of this company was $750,000. The company owned and was using 1,000 patents and it was agreed that these patents were worth at least $4,560,000. If these patents were worth that amount to the purchasers, it is believed by some that the Chemical Foundation got its 4,500 patents too cheaply."

This is just one more example of the manner in which the public, knowing nothing of the Chemical Foundation, can be led to believe, by inference, almost anything a shrewd publicity agent chooses to have it believe. Now, merely because 1,000 given patents happen to be worth more than four million dollars, that is no proof—or even argument—that 4,500 other patents are worth a greater sum. Neither is it proof that the latter patents are *not* worth a greater sum. It simply does not mean anything at all. Note particularly the phrase "and was using." Tried and tested patents *in use* by a firm which spends millions of dollars to advertise the products of those patents are a very different sort of proposition from patents not in use in this country, particularly when the possible use of many of them is highly problematical owing to omissions in specifications. Anyone knows, who stops to think, that the files of the Patent Office are clogged with thousands of patents which literally are not worth, to anyone, the paper they are printed upon. But the public, in the aggregate, rarely stops to think in a matter of that kind, depending, instead, upon the newspapers to provide a correct interpretation of the facts.

Again, the assumption would naturally be that the Chemical Foundation is a manufacturing concern, whereas it is not a business enterprise at all. It will be recalled that its capital was fixed at $500,000, of which $250,000 was paid for the patents and $250,000 retained as a working capital. Its purpose provided for "holding the patents as a trustee for American industry, for the Americanization of such institutions as may be affected thereby, for the exclusion or elimination of alien interests hostile or detrimental to the said industries, and for the advancement of chemical and allied science and industry in the United States." The voting stock of the corporation was placed in a voting trust, of which the trustees were George L. Ingraham, Otto T. Bannard, Cleveland H. Dodge, Benjamin H. Griswold and Ralph Stone The charter of the organization was so framed that under the patents non-exclusive licenses only could be granted on equal terms to all proper applicants, and were obliged to be granted to the United States *free of cost*. Of the $500,000 capital, $400,000 was made 6 per cent cumulative preferred stock and $100,000 common stock, also limited to 6 per cent dividends. The charter further provided that surplus income was to be used for the retirement of the preferred stock, and thereafter for the advancement of chemical and allied science and industry.

At the time of its organization, A. Mitchell Palmer, then Alien Property Custodian, stated in explanation of the procedure adopted: "The price paid for the patents was necessarily determined somewhat arbitrarily; the great majority of the patents were presumably valueless. The value of the remainder was entirely problematical and impossible to estimate. Substantially the entire industry having combined for the purpose of this purchase, it would have been impossible on public sale to find as a bidder any legitimate manufacturer. No other bidder could, therefore, have been found on public sale except some speculative individual who might have bought them for purposes practically amounting to commercial blackmail. The combination was not objectionable to public policy, since

it was so organized that any genuine American, whether a stockholder in the company or not, could secure the benefits of the patents on fair and equal terms."

Now that the investigation is really about to start, it is well to bring up these facts again and give them some attention. Presumably they will all be brought out during the course of the questioning, and will be made the subject of comment in the press. Those who are aware of them in advance will be all the more interested, it may be assumed, in the subsequent fate of Senator Moses and his chart, should that gentleman attempt to bring it into the proceedings.

RESEARCH AND THE A. A. T. C. C.

IN a recent editorial in the columns of the "Journal of Industrial and Engineering Chemistry," organ of the American Chemical Society, Harrison E. Howe states: "There is at least one textile mill in America which has continued to run at capacity. It has experienced no season of slack orders and it has made no reduction in its scientific staff. The president of this mill—Joseph Bancroft & Sons Company—tells us that his success has been due to the fact that his scientists by continued research have kept his mill four or five years ahead of the procession. He is producing materials that have no competition. He is offering uniquely dyed fabrics which are in a class by themselves and when there is a buyers' market, a mill in this position has an unusual advantage. The president of this mill proposes to increase research, for he knows he cannot possibly afford to curtail it."

This is but another instance of the benefits reaped by those in the textile industry who have accorded American chemistry its due and employed the great power of competent research for their own advantage. As compared with many other industries which might also be benefited by research, the textile industry is not so far behind, but when gauged by its peculiar susceptibility to this force, it is still far from realizing the ideal state.

Herein is one of the most important reasons for the existence of the American Association of Textile Chemists and Colorists. At the second Research Committee meeting of that organization, attention was called to the fact that the opinion had been expressed by a number of manufacturers, not members of the Association, that a decided prestige would accrue to the Association if its members could define fastness tests for dyestuffs and finished fabrics, and have them accepted as official. It was the opinion of the Council that more could be accomplished by confining the efforts of the organization temporarily to the washing of cotton, and it was decided first to formulate provisional methods which could be published and ultimately adopted as official after time had been given for criticism. Such a method, it was brought out, should be accompanied by the statement that it was to be employed only on the type of fabric designated, and not upon any other fabric.

Thus, the advantages of having, within the industry, an official body composed only of men of the highest standing and ripe experience, become apparent. The first consideration in the straightening out of the seemingly never-ending fastness controversy between dye manufacturer, textile mnufacturer and chemist is the arbitrary designation of a common ground of phraseology whereon all may meet and converse with perfect understanding of what is meant. Hitherto there has been no group with sufficient magnitude or authority to define such grounds. Now a definite code can be established the various terms comprising which can mean respectively, one, and only one, degree of "fastness" upon a single classification of fabric. Having determined among themselves exactly what is meant by fastness under given circumstances, the researchers can then work out standard formulae to meet the requirements of the code. Goods need then no longer be purchased with the eyes shut, or at least half shut, to their qualifications for the fulfilment of certain purposes, and members of the A. A. T. C. C., interested both as chemists and as manufacturers, should have no trouble in reaching an agreement which all will respect.

Because of the undoubted additional prestige which the organization will gain from straightening out the present tangle, its influence should become great enough to make its opinions as to the high general value of both individual and co-operative research received with greater seriousness, and its ability to circulate these opinions increased, so that it may become a most powerful factor in hastening the approach of that day when the true value of research to the textile industry shall have become fully understood.

Dr. Herty's Jersey City Address

Additional Correspondence from Seebohm, of Griesheim-Elektron Works, and from Dr. Ernster

ADDITIONS to the correspondence provoked by Dr. Charles H. Herty's Jersey City address, which was printed in The REPORTER of December 12, have arrived in the shape of a communication from the Chemische Fabrik Griesheim-Elektron, Frankfurt a.M., over the signature of Dr. Seebohm of that firm, and another letter from Dr. Nicolas Ernster. The former letter refers to the article of December 12, and reached this office after Dr. Ernster's denial and Dr. Herty's reply thereto had been printed in the last issue of this journal, January 30. It was addressed to Paul Nobbe, of the Commonwealth Color & Chemical Company, who had forwarded the issue of December 12, containing the Herty speech, to Dr. Seebohm in Germany. The facts upon which the various communications are based were given in the January 30 issue, and it remains only to print the letters themselves, which are self-explanatory:

[Letterhead of the Commonwealth Color & Chemical Co., Brooklyn, N. Y.]

February 6.

To the Editor of The REPORTER:

In your issue of the AMERICAN DYESTUFF REPORTER of January 30 there appears an article under the heading "Dr. Herty's Jersey City Address—A Denial and a Reply."

I think that in justice to the foreign gentlemen, who are not here to defend themselves, you should print the letter which we enclose herewith, addressed to the writer, dated January 7.

PAUL NOBBE.

[Letterhead of Chemische Fabrik Griesheim-Elektron, Frankfurt a.M.]

To Mr. Paul Nobbe: January 7.

Mr. Seebohm asks us to thank you for your letter of the 21st ult. and for sending us the copy of the AMERICAN DYESTUFF REPORTER of December 12.

We have heard of this matter before and beg to say that the statements alleged to have been made by Mr. Von Weinberg and Mr. Seebohm are a *pure and malicious fabrication* and that not one single word of it is true.

We presume that the originator of this report refers to an interview our Mr. Seebohm had with some American gentlemen some months ago, and that for certain purposes the facts discussed have been wilfully and maliciously distorted.

(Signed) CHEMISCHE FABRIK GRIESHEIM-ELEKTRON.
SEEBOHM,
p.p. O. S. S.

Following the report of the above, in which the italics are the correspondent's, another letter was received from Dr. Ernster in which the latter again repeats his denial of statements attributed to him, and declares that so far as he is concerned the incident is closed. It is not the policy of The REPORTER, it may be added, to substitute blanks for proper names, but since it was begun in the present case we must permit our correspondents to follow their own desires. Dr. Ernster's letter follows:

[North Billerica, Mass.]

February 7.

To the Editor of The REPORTER:

In answering my letter printed in your edition of January 30, Dr. Herty publishes a communication from Mr. Zinsser in which he states the following:

> "I dislike very much getting into a discussion with the Doctor, but as he questions the truthfulness of the statements made to you, I wish to repeat again the conversation he had with my son, the head of our dye sales organization, and a third person.
>
> "Dr. Ernster did state that the German manufacturers, among whom he mentioned Mr. Seebohm, had complete records of the activities, yields and methods of the American dyestuff and chemical plants. In this connection he mentioned that the person with whom he spoke took from his files a paper from which he read the details.
>
> "He furthermore stated that his informant told him that, in case of an embargo, the Germans would at once begin to build, and that they know the exact cost of the plants in this country and could duplicate them at a small fraction of their original cost. This information was given as coming either from von Weinberg or one of his assistants." Etc.

After reading this I submitted the whole correspondence to the fourth person present, Dr. ——— [Note—This is the "third person" referred to in Mr. Zinsser's letter.—Ed.], and as answer received the following letter:

> "Dear Dr. Ernster:
>
> "I was very surprised when I heard that your private conversation with Mr. J. S. Zinsser, our friend Mr. Lehmann, and myself, was in part inexactly published without your knowledge and consent.
>
> "Our friends misconstrued, evidently, some important parts of your discussion, in which you expressed your personal views and opinions of the industrial conditions abroad and in this country.
>
> "The misunderstanding must have come through the fact that you had mentioned during the conversation your visit to the heads of the German dyestuff people, and that they understood the following arguments, as originated by those persons, which is a pure invention. I will not go into details like the legend of Mr. Seebohm's 'filed records,' or the embargo question, etc., and I hope this will help to clear up the truth about this conversation. "Dr. ———."

So far for the third person present during our conversation. As for myself, I refer Dr. Herty and Mr. Zinsser again to my letter of January 30, and insist once more that none of these statements was made to me by the German manufacturers, and I certainly did not say in our conversation that they were made to me.

I wonder why Mr. Lehmann signed these statements? If he had remembered our private conversation just before and after our meeting with Mr. Zinsser, Jr., he probably would have hesitated before doing so. If he wishes me to remind him, I will gladly do so privately.

So far as I am concerned, I consider the incident closed.

DR NICOLAS ERNSTER.

Foreign Dyes Licensed by Treasury Department for January Import

Switzerland Records Tremendous Decline; England Gains; Germany Falls Off, and France Sends None

LICENSED imports of dyestuffs, which totaled 201,221 pounds, showed a further decline as against the 308,787-pound total for December, the 520,212 pounds of November, and the 768,858 pounds of October.

The German total fell off from the 149,365-pound contribution of December, and in January sent us only 117,275 pounds. This figure is large, however, as compared with Germany's 92,864 pounds of November, but small in comparison with her 418,344 pounds of October. Once more there were no licensed importations from France, while England showed a gain by sending here 46,550 pounds in January as against 38,720 of December. Switzerland showed the greatest loss, sending but 37,396 pounds in January as against 120,702 in December.

Following is the complete list giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during January. This tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Aceto Purpurine 8B	550	....
Acid Alizarine Black R	1,300	....
Acid Alizarine Gray G	600	....
Acid Anthracene Brown RH Extra	300	....
Acid Anthracene Red 5BL	250	....
Acid Pure Blue R Supra	....	110
Acid Rhodamine BG	5	....
Acid Rhodamine R	....	220
Acridine Orange	....	501
Algol Blue 3G Powder	10	....
Algol Blue 3G Paste	50	....
Algol Blue K Powder	10	....
Algol Blue K Paste	450	....
Algol Brilliant Violet R Paste	10	....
Algol Brown G Powder	185	....
Algol Brown R Powder	422	....
Algol Corinth R Paste	516	....
Algol Corinth R Powder	10	....
Algol Green B Powder	10	....
Algol Olive R Powder	10	....
Algol Orange R Powder	10	....
Algol Orange R Paste	225	....
Algol Red B	50	....
Algol Red 5G Powder	10	....
Algol Yellow R Powder	100	....
Alizarine VI Extra Pure 20%	450	....
Alizarine Astrol B	125	....
Alizarine Black B	10	....
Alizarine Blue S Powder	2,000	....
Alizarine Blue SAWSA	1,550	....
Alizarine Blue SAE	100	....
Alizarine Blue SKY	125	....
Alizarine Blue WS	50	....
Alizarine Blue Black B Powder	805	....
Alizarine Blue Black 3B	500	....
Alizarine Cyanine Green E	200	....
Alizarine Cyanine Green G Ex. Pdr.	1,980	....
Alizarine Cyanine Green 3G Powder	134	....
Alizarine Emeraldole G Powder	100	....
Alizarine Green CE	250	....
Alizarine Indigo B	500	....
Alizarine Indigo G	500	....
Alizarine Irisol R	25	....
Alizarine Orange AO 20% Paste (from England 200 lbs.)	....	....
Alizarine Orange R Powder	100	....
Alizarine Red	....	4,400
Alizarine Red S	100	....
Alizarine Red SWB	100	....
Alizarine Red W Powder	3,655	....
Alizarine Red YCA 20% Paste (from England 100 lbs.)	....	....
Alizarine Rubinole 3G	500	....
Alizarine Rubinole 5G Powder	200	....
Alizarine Rubinole R Powder	2,025	....
Alizarine Saphirol B	800	....
Alizarine Saphirole SE Conc	285	....
Alizarine Sky Blue B Powder	1,689	....
Alizarine Viridine FF Paste	2,000	....
Anthracene Acid Black ST	500	....
Anthracene Blue SWGG Ex. Powder	200	....
Anthracene Blue WR Double Paste	20,000	....
Anthracene Chrome Brown EB	50	....
Anthraflavone G Paste	250	....
Anthraquinone Green GXNO	250	....
Azo Acid Black B	400	....
Azo Carmine GX	1,510	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Benzo Fast Black L	100	....
Benzo Fast Blue 4GL	1,000	....
Benzo Fast Red 8BL	1,750	....
Benzo Rhoduline Red B	450	....
Brilliant Acid Blue V	1,000	....
Brilliant Benzo Fast Violet B	50	....
Brilliant Benzo Fast Violet BL	225	....
Acridin Red 3B	50	....
Algol Red R Extra	175	....
Algol Red R Extra Paste	25	....
Algol Red 2F Paste	500	....
Anthraquinone Violet 6	100	....
Anthraquinone Blue SR Extra	100	....
Brilliant Cresyl Blue 2B	50	....
Brilliant Benzo Fast Violet 4BL	50	....
Brilliant Benzo Fast Violet 2R	50	....
Brilliant Benzo Violet 4BL	50	....
Brilliant Benzo Violet 2RL	200	....
Brilliant Fast Blue B	75	....
Brilliant Fast Blue GG	50	....
Brilliant Germaine 2BN	250	....
Brilliant Indigo B Paste	300	....
Brilliant Indigo G Paste	200	...
Brilliant Milling Blue B	40	....
Brilliant Milling Orange GR	25	....
Chinoline Yellow	500	....
Chinoline Yellow KT Extra Conc	300	....
Chloramine Red 8BS	600	....
Chlorantine Fast Blue BL	....	2,200
Chlorantine Fast Blue 2GL	....	550
Chlorantine Fast Blue RL	....	1,971
Chlorantine Fast Bordeaux 2BL	....	1,100
Chlorantine Fast Brown 3GL	....	211
Chlorantine Fast Brown RL	....	770
Chlorantine Fast Gray GL	....	110
Chlorantine Fast Red 7BL	....	1,696
Chlorantine Fast Violet BL	....	110
Chlorantine Fast Violet 4BL	....	330
Chlorantine Fast Violet RL	....	101
Chlorantine Fast Violet 2RL	....	215
Chlorantine Fast Yellow 4GL	....	132
Chlorantine Fast Yellow RL	....	310
Chromazan Brilliant Blue G	20	....
Ciba Blue 2B Powder	....	798
Ciba Blue 2BD Paste	....	440
Ciba Blue 2BD Paste Pat	....	440
Ciba Blue G Powder	....	50
Ciba Bordeaux B	....	1,100
Ciba Orange G 10% Paste	....	55
Ciba Pink BG Powder	....	11
Ciba Red G Powder	....	220
Ciba Scarlet 20% Paste	....	220
Ciba Scarlet G Powder	....	245
Ciba Scarlet G 20% Paste	....	770
Ciba Violet B Paste	....	6,600
Ciba Violet B Powder	....	220
Ciba Violet B Powder Pat	....	440
Cibanone Green B Paste Pat	....	110
Coriphosphine OX Extra	250	....
Cross Dye Green B (from England 14,000 lbs.)	....	....
Cross Dye Green 2G Conc (from England 4,050 lbs.)	....	....
Crystal Violet Extra	1,000	....
Cyananthrol BGA	10	....
Cyananthrol BGAO	448	....
Cyanine B	200	....
Cyanole FF	1,600	....
Ciba Scarlet G Extra	....	550
Cibanon Orange R	....	550
Diamine Azo Scarlet BBL Extra	100	....
Diamine Catechine B	....	320
Diamine Catechine B	20	....
Diamine Catechine G	125	....
Diamine Catechine 3G	25	....
Diamine Fast Blue FFB	100	....
Diamine Fast Brown GB	50	....
Diamine Fast Brown R	50	....
Diamine Fast Orange ER	200	....
Diamine Scarlet B	100	....
Dianil Developer G	100	....
Dianil Developer 3G	100	....
Diazo Brilliant Black B	500	....
Diazo Brilliant Scarlet S4B	50	....
Diazo Brilliant Black 6B Extra	100	....
Diazogene Orange GR Extra	25	....
Diphenyl Chlorine Yellow FF Supra	....	500
Direct Brown 2G	....	1,386
Euchrysine GRNTX	1,025	....
Erika B Extra	100	....
Erika 2GN	25	....
Erio Carmine 2BC	....	110
Euchrysine RRDX	500	....
Fast Acid Marine Blue HBBX	500	....
Fast Mordant Blue B	4,000	....
Fastigene B	10	....
Flavinduline O	25	....
Gallo Indigo Blue S Powder	500	....
Fast Mordant Yellow G	100	....
Hansa Yellow 5G	100	....
Helindone Brown 3GN Paste	25	....
Helindone Pink AN 10% Paste	50	....
Helindone Pink AN Paste	30	....
Helindone Pink B Extra	25	....
Helindone Pink BN 10% Paste	600	....
Helindone Pink R Extra Paste	10	....
Helindone Pink BN Paste	50	....
Helindone Pink R Extra	25	....
Helindone Rose R Extra Paste	800	....
Helindone Violet R Paste	25	....
Helio Fast Blue SL Conc	6,600	....
Hydron Blue R Powder	200	....
Hydron Blue R 30% Paste	500	....
Hydron Blue R	25	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Hydron Bordeaux B Paste	25	....
Hydron Bordeaux R Paste	25	....
Hydron Pink FB Paste	35	....
Hydron Pink FF Paste	35	....
Hydron Yellow NF Paste	25	....
Immedial Violet C	100	....
Anthraflavone GC Paste	10	....
Indanthrene Blue GC Powder	275	....
Indanthrene Blue GCD Dbl. Paste	2,100	....
Indanthrene Blue 2GSP Dbl. Paste	500	....
Indanthrene Blue 3G Paste	10	....
Indanthrene Blue 3G Dbl. Paste	10	....
Indanthrene Blue RS Dbl. Paste	500	....
Indanthrene Blue RS Triple Powder	1,888	....
Indanthrene Blue RSP Triple Pdr	1,260	....
Indanthrene Blue RZ	2,500	....
Indanthrene Blue WB Powder	50	....
Indanthrene Blue WBO Powder	100	....
Indanthrene Brown B Dbl. Paste	3,434	....
Indanthrene Claret B Extra Paste	242	....
Indanthrene Golden Orange G Dbl. Paste	1,500	....
Indanthrene Golden Orange RRT Paste	4,087	....
Indanthrene Golden Orange RRT	200	....
Indanthrene Golden Orange RRT Dbl. Paste	500	....
Indanthrene Green B Dbl. Paste	1,000	....
Indanthrene Pink B Dbl. Paste	760	....
Indanthrene Red B Extra	2,674	....
Indanthrene Red Violet RRN	510	....
Indanthrene Ecarlet G Pst. or Pdr	175	....
Indanthrene Violet BN Extra Paste	1,510	....
Indigo MLB6B Powder	200	....
Japan Black Extra	100	....
Kiton Fast Blue V Pure	....	220
Lanasol Blue B	....	290
Lanasol Brown 2R	....	440
Lithol Rubine 3B	20	....
Madder Lake (from England 3,000 lbs.)	....	....
Madder Lake	350	....
Madder Lake	333	....
Methylene Heliotrope O Ex. Conc	500	....
Methyl Green Yellowish	2	....
Milling Yellow O	275	....
Napthamine Fast Black KSG Extra	25	....
Napthamine Fast Black KSV Extra	25	....
Napthamine Light Blue B	25	....
Napthamine Light Blue 4B	25	....
Napthamine Light Blue R	25	....
Napthamine Light Green G	25	....
Napthamine Fast Gray B	25	....
Napthamine Light Red 6B	25	....
Napthamine Light Red R	25	....
Napthamine Light Violet 2B	25	....
Napthamine Blue B	525	....
New Methylene Blue N	287	....
Nile Blue BX	10	....
Oxamine Light Brown G	500	....
Oxamine Red 3BX	100	....
Patent Blue AS	....	1,300
Patent Phosphine G	....	499
Patent Phosphine M	....	121
Patent Phosphine R	....	110
Peacock Blue Lake	510	....
Pluto Brown 2G	100	....
Pyramine Orange RR	35	....
Wool Black GR	1,000	....
Pyrazole Orange G	....	3,000
Pyrogene Direct Blue BL	....	400
Pyrogene Green 3G	....	550
Pyrogene Green 3G 270%	....	242
Rhodamine 6GDN Extra	625	....
Rosanthrene Orange R	....	176
Rosinduline 2B Bluish	1,102	....
Sericose L	100	....
Silk Blue IV	100	....
Thioflavine T	1,900	....
Thio Indigo Pink RN Extra Paste	200	....
Thio Indigo Rose BN Extra Paste	1,120	....
Thionol Brown O (from England 4,000 lbs.)	....	....
Thionol Brown R (from England 600 lbs.)	....	....
Thionol Green DY (from England 12,100 lbs.)	....	....
Thionol Yellow 3RD (from England 8,000 lbs.)	....	....
Toluylene Fast Brown 2R	200	....
Vat Pink R Extra	10	....
Victoria Pure Blue BO	500	....
Zambesi Pure Blue 4B	125	....
Brilliant Lake M	225	....
Celosia Lake B	225	....
Viridin Lake	610	....
Light Green SF Yellowish	22	....
Pure Soluble Blue	1,000	....
Sulphon Azurine D	500	....
Palatine Light Yellow RX	100	....

Totals:	
Germany	117,275
England	46,450
Switzerland	37,396
Grand Total	201,221

The Federal Silk Hosiery Works, Inc., Brooklyn, N. Y., has been incorporated, under the laws of New York, to manufacture hosiery. The capital is $10,000. Incorporators are: William Cooper, 401 Grand Street, New York; Ira Zuckerman, Brooklyn, and Helen Cooper, New York.

DU PONT CHEMICAL FELLOWSHIPS RENEWED FOR COMING YEAR

E. I. du Pont de Nemours & Co. has authorized the continuance of Du Pont chemical fellowships in twenty colleges and universities throughout the United States for the scholastic year of 1922-1923. The total value of these is $15,000. The fellowships are for postgraduate work and are placed in the institutions which have well established postgraduate courses.

The recipients are to be selected not by the company, but by the university authorities, the only condition made by the company being that the awards shall go to graduates who devote the major part of their time to the study of chemistry.

The object of the plan is to promote the study of chemistry and to assist deserving students, who have shown especial aptitude for chemistry, to pursue further work. This differs from the usual plan for industrial fellowships in that the company does not insist on the student carrying out an investigation on subjects in which the company is interested, but leaves him free, under the direction of his instructors, to follow whatever line of investigation seems to him most promising. The institutions which receive these felloships are:

Brown University, Providence, R. I.; California Institute of Technology, Pasadena, Cal.; University of California, Berkeley, Cal.; University of Chicago, Chicago, Ill.; Cornell University, Ithaca, N. Y.; Delaware University, Newark, Del.; Harvard University, Cambridge, Mass.; University of Illinois, Urbana, Ill.; Johns Hopkins University, Baltimore, Md., Lafayette College, Easton, Pa.; Massachusetts Institute of Technology, Boston, Mass.; University of Michigan, Ann Arbor Mich.; University of Minnesota, Minneapolis, Minn.; Ohio State University, Columbus, Ohio; Princeton University, Princeton, N. J.; University of Virginia, Charlotteville, Va.; University of Washington, Seattle, Wash.; University of Wisconsin, Madison, Wis.; Yale University, New Haven, Conn.; Columbia University, New York, N. Y.

For the past four years chemical fellowships and scholarships have been established in American institutions of learning by the Du Pont Company. The policy was adopted at the time of the war, when all chemical imports from Europe were shut off and the need for developing in this country a self-contained native chemical industry, the first requirement of which is large numbers of research chemists, was demonstrated.

The Viscose Corporation of Virginia, Roanoke, Va., has been incorporated to manufacture and deal in dry goods and fabrics of all kinds. The incorporators are: President, Dr. C. A. Ernst, Ridley Park, Pa.; secretary, Charles H. Hendrickson, Philadelphia, and Whitwell W. Coxe, Frank W. Rogers and Joseph H. Chitwood, all of Roanoke.

DYERS AND CLEANERS SUPPORT "TRUTH-IN-FABRIC" BILL; WOULD RAISE STANDARDS OF DYEING

An organized campaign to protect the public in the purchase of clothes by a law similar to the pure food law has been started in Chicago, where delegates from every State in the Union and from Britain and Canada met last Monday in the Hotel La Salle for the eleventh annual convention of the National Association of Dyers and Cleaners. The members are pledging support of the French-Capper pure-fabric bill, now in Congressional committee, which would compel every manufacturer of woven fabrics to mark the selvedge edge, stating whether it is virgin wool or mixed with shoddy, and the percentage.

Arthur Berg, vice-president of the association, emphasized the point that when a dealer tells a customer a garment is wool he may be telling the truth, although much of that wool may be shoddy, and after it is worn a short time the garment looks like a "hand-me-down."

The delegates also planned to raise the standards of dyeing and cleaning all over the country, urging laws similar to those passed in Ohio and Indiana, governing the plants and equipment. The association has an insurance company which admits only members whose plants are of the standard type.

BYRON, HEFFERNAN & CO. ANNOUNCE CHROME BLACK SW AND CHROME FAST BROWN MP

Byron, Heffernan & Co., Elizabeth, N. J., have announced placing on the market two new colors, Chrome Black SW and Chrome Fast Brown MP.

Chrome Black SW is a new addition to American-made chrome colors. It is a straight color which can be dyed by the top chrome, bottom chrome or monochrome methods, and in each case leaves silk effects absolutely white. It possesses excellent solubility, dyes level and exhausts well from the dye bath, being only slightly affected by metals. It also possesses extreme fastness to light, perspiration and organic acids, as well as to washing, fulling and potting. This product should be of especial interest to dyers of men's silk stripe woolens who want a straight chrome black in order to get consistent, uniform results.

Chrome Fast Brown MP is also a very desirable color for dyeing silk-effect woolens, as it also can be dyed by the top chrome, bottom chrome or monochrome methods and leaves the silk absolutely white. This product yields a bright, deep shade of brown possessing extreme fastness to light, soaping, fulling, perspiration and potting. It likewise has unusual level dyeing properties and can be used in mixtures to make any shade of brown by the use of Chrome Green SE.

Product samples and dyeings may be obtained by addressing the company's works at Elizabeth, N. J.

BAYER AND MONSANTO COUNSEL AT ODDS OVER "ASPIRIN" TRADE-MARK

Edward S Rogers, Chicago, as counsel for the Bayer & Co., has addressed a letter to certain members of the wholesale drug trade in which it is demanded that the wholesaler desist from the use of the word "aspirin" altogether except in connection with company's product. The opinion and decree in the Bayer-United Drug Company suit is quoted apparently to substantiate a statement that "The Bayer Company, Inc., contends that the word 'aspirin' is its trade-mark which may not lawfully be applied to any substance not of its production in any dealings with any one." Legal proceedings against all who "violate this right" are promised.

Taking cognizance of this message, Paul Bakewell, as counsel for the Monsanto Chemical Works, has written Mr. Rogers, reviewing the decision in the Bayer-United Drug Company case and pointing out that in any event that decree is binding upon no one except the parties and privies to that suit. He goes further to point out that the claim of the Bayer Company to exclusive rights to the word "aspirin" is not in keeping even with the aforementioned decree, but is in fact contradicted thereby.

It will be recalled that the court refused to restrain the United Drug Company from using the name "aspirin" on certain packages of acetyl-salicylic acid tablets handled in dealings direct with the consumer.

J. F. WARNER TO GIVE THIRTY-LECTURE COURSE ON BLEACHING, DYEING, PRINTING AND FINISHING AT N. Y. TEXTILE H. S.

Announcement is made of a course of thirty lectures on "The Bleaching, Dyeing, Printing and Finishing of Textile Fabrics," to be given at the New York Textile High School, by John F. Warner, of the Bronx Finishing Company, New York City. Mr. Warner, who is a charter member of the American Association of Textile Chemists and Colorists, is well qualified through broad experience in mill work to present the various angles of such a subject from both the theoretical and the practical viewpoint. While the course is designed principally for converters of textiles who desire a knowledge of fundamental dyeing, printing and finishing operations, the course is open to all students of such subjects living in New York. Full details may be obtained on application to the New York Textile High School, 124 West Thirtieth Street, New York City.

The Atteaux Dyestuff & Chemical Company, Toronto, Canada, sole agents for Farbenfabriken vorm. Friedr. Bayer & Co., announces that its principals "have devised a chemical process to render wool immune from the attack of moths without affecting its valuable properties in the slightest degree." The product is "Eulan F," referred to in the last issue of The REPORTER by U. S. Consul Young.

DYE LOBBY PROBE DEFINITELY SET FOR FEBRUARY 14

Public hearings on the methods alleged to have been employed in the several branches of the dyestuff industry to influence legislation are scheduled to commence on Tuesday, February 14. An informal meeting was held last week by Senator Shortridge of California, chairman of the investigating committee, and Senator Ernst of Kentucky, to listen to a statement by Senator King of Utah. Senator Reed of Missouri, the third member of the committee, was out of the city, but it was expected that he would return by the end of the week, permitting the investigation to get under way this week.

The attitude of the American Dyes Institute with respect to the inquiry was made known when a letter by President R. C. Jeffcott, addressed to Senator Shortridge, was made public.

This letter declared that members of the Institute were ready to leave their own affairs at any time in order to co-operate with the investigators, as did a telegram from Irenee du Pont, president of E. I. du Pont de Nemours & Co.

Dr Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, also sent a letter offering co-operation.

Senator King, sponsor of the resolution calling for an investigation of the dye industry, urged the committee to employ counsel to conduct the case. It is understood that the committee holds the opinion that it has not the authority to do so. Senator King has announced that in the absence of such authority he will appear before the committee as the prosecuting witness.

TEXTILE ALLIANCE DISCONTINUES CONTRACT AND ORDER FORM NO. 5

A recent announcement from the Textile Alliance to the trade reads:

"You are hereby advised that hereafter the use of Contract and Order Form No. 5 will be discontinued, and instead the acceptance of consumers' orders, on their own forms, will be confirmed by an acknowledgment containing the following provision:

> The Textile Alliance, Inc., agrees to supply the dyes above if included in stocks on hand or if obtainable from reparation sources, but assumes no responsibility in the event of its inability to supply all or any part thereof.

"By inserting our serial numbers in their orders, purchasers will avoid unnecessary correspondence, delay, and the possibility of misunderstanding as to the colors wanted.

"With each order the purchaser should send the Textile Alliance, Inc., either the Import Permit of the

Treasury Department, or Consumer's Statement executed in duplicate; on receipt of the latter the Textile Alliance, Inc., will apply to the Treasury Department for the permit."

F. W. PICKARD NOW DYE SALES DIRECTOR FOR DU PONT

M. R. Poucher and C. A. Meade Become Executive Staff Officials

Development of American dyes has such an important part of the Du Pont Company's activities that the Dyestuffs Department has been so strengthened that its personnel can better handle the technical and commercial problems which the new industry presents.

F. W. Pickard, vice-president, has been relieved of his duties as a member of the Executive Committee to become General Manager of the department, with W. F. Harrington as assistant.

C. A. Meade, vice-president and former general manager, who has been connected with the Dyestuff Department since its organization, and also M. R. Poucher, former director of sales, have been made executive staff officials. Both are directors of the Du Pont Company.

Mr. Pickard has been connected with the Du Pont explosives and chemical industries for twenty years. On October 30, 1918, he was elected vice-president and director of the company and was made a member of the Executive Committee. Up to the time of the recent reorganization of the company, he represented the general sales activities on the Executive Committee.

Mr. Poucher has been associated with the dye industry for many years and is one of the best-known and most prominent men in the trade in America. When the Du Pont Company decided, in 1915, to go into the manufacture of dyes, he joined the organization and has been most actively engaged in the development of the industry in this country. He has been holding the title of director of sales but, because of the the increasing need for his services in solving the development problems constantly arising, he has been relieved of the routine duties of that office and Cesare Protto, his assistant, has been made director.

A new article of manufacture has been improvised by the Societe d'Impression des Vosges et de Normandie. Cotton fabric is the medium employed, and this is treated so that it resembles wool or silk goods with a moire or iridescent effect. The cotton is woven on a jacquard loom so that it appears irregular and of a granite effect. The fabric is then printed in milleraies style, whereby a number of fine lines very close to each other are shown. The milleraies design may extend over the whole surface of the cotton, both back and front, or may occupy portions only. The lines may run in several directions, and the effect produced is of moire or iridescent wool or silk.

S. D. PERLMAN NOW WITH BYRON, HEFFERNAN & CO.

S. Donald Perlman has resigned from the Standard Color Company as New York manager of that concern to accept the position of director of sales with Byron, Heffernan & Co., Elizabeth, N. J., manufacturers of dyestuffs. Mr. Perlman is also president of the Dyetex Engineering Company, consulting dyestuff engineers, and is well known in the trade.

DR. L. A. PRATT BECOMES DIRECTOR OF RESEARCH FOR MERRIMAC

Announcement is made by the Merrimac Chemical Company, 148 State Street, Boston, Mass., to the effect that Dr. Lester A. Pratt, who has been in charge of the company's research laboratory for the past six years, has been made director of research for the firm.

ATTRACTIVE PROGRAM ARRANGED FOR PHILADELPHIA SYMPOSIUM ON TEXTILE MANUFACTURE AND ECONOMICS

Many features of the textile industry are listed in the program covering the Symposium on Textile manufacture and Economics, to be held under the joint auspices of textile and engineering societies, on February 28, in Philadelphia.

Among the organizations participating in the symposium will be: American Cotton Manufacturers' Association, Converters' Association, Engineers' Club of Philadelphia, Franklin Institute of the State of Pennsylvania, Manufacturers' Club of Philadelphia, National Association of Cotton Manufacturers, National Association of Finishers of Cotton Fabrics, National Association of Wool Manufacturers, Pennsylvania Manufacturers' Association, Philadelphia Chamber of Commerce, Philadelphia Textile Manufacturers' Association, Philadelphia Textile School and the Philadelphia Alumni Association. The Philadelphia sections of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers will also attend the symposium.

The first event listed on the program is a morning inspection trip to the Philadelphia Textile School. Inspection trips will also be made to examine the manufacture of worsted yarns, upholsteries and pile fabrics, plushes, fancy cottons, dress goods, curtains, carpet mills, hosiery and knit fabrics.

The afternoon session will be called to order in the auditorium of the Manufacturers' Club of Philadelphia by William F. James, president of the Engineers' Club of Philadelphia. Open topical discussions will be on "Contrasts in British and American Textile Manufacturing Practice" and "Worsted Manufacture," which will be lead by William D. Hartshorne, Lawrence, Mass. Other topics will be wool sorting, scouring, worsted carding, combing, drawing, spinning, weaving, etc.

A discussion of cotton manufacture lead by Sydney B. Paine, Boston, will follows. Particular points of discussion will include: The picker room versus the blowing room, the card room, spinning, warp dressing and weaving.

Motion pictures of the woolen industry will follow, which will include "A Woolen Yarn," in one reel.

This is the story of the wool industry, from the shearing of the sheep to the finished product. The shearing, hand spinning and weaving operations were photographed in Vermont; the Indian spinning and weaving was done at Albuquerque, N. M.; the modern textile scenes were taken at the Grundy plant at Bristol, Pa.

Two reels, "In the Land of Cotton," will follow, which will be a story depicting the cotton industry from the planting of the seed to the finished fabric. The field scenes were made at the Delta & Pine Land Plantation, Scott, Miss., and the textile mill scenes at the Nashua Manufacturing Company, Nashua, N. H., respectively the largest cotton plantation, the largest cotton terminal and the largest cotton blanket mill in the world.

At a subscription dinner the toastmaster will be Charles J. Webb, president of the Philadelphia Textile Manufacturers' Association. Brief after-dinner speeches will be given by Alba B. Johnson, president of the Philadelphia Chamber of Commerce, and John E. Rousmaniere, New York, who will speak on "Co-operation in the Cotton Industry." W. Irving Bullard, vice-president of the Merchants' National Bank, of Boston, will speak on European conditions affecting our textile industry. Alber Greene Duncan, treasurer of Harmony Mills, Boston, will speak on European textile conditions and the world cotton conference at Manchester in 1921.

The evening technical session, to follow immediately after the dinner, will be in the auditorium of the Manufacturers' Club. Leo Loeb, member of the American Society of Mechanical Engineers, will address the meeting on problems and economics of the textile power plant

Charles M. Mumford, Lockwood, Greene & Co., Boston, will speak on the mechanical handling of materials in textile plants.

The general committee in charge of the symposium is made up as follows:

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Charles Penrose, chairman of committee, vice-chairman, American Society of Mechanical Engineers, Philadelphia section; Winston D. Adams, secretary, American Cotton Manufacturers' Association, Charlotte, N. C.; Samuel M. Fisher, secretary, Converters' Association, 291 Broadway, New York, N. Y.; Charles E. Billin, secretary of committee, secretary, Engineers' Club of Philadelphia, Philadelphia; Major R. B. Owens, secretary, Franklin Institute of the State of Pennsylvania, Philadelphia; Thomas F. Armstrong, secretary, Manufacturers' Club of Philadelphia, Philadelphia; H. C. Meserve, secretary, National Association of Cotton Manufacturers, Boston, Mass.; H. E. Danner, secretary, National Association of Finishers of Cotton Fabrics, New York; and Paul T. Cherington, secretary, National Association of Wool Manufacturers, Boston, Mass.; W. W. Finn, secretary, Pennsylvania Manufacturers' Association, Philadelphia; N. B. Kelly, general secretary, Philadelphia Chamber of Commerce; J. Lewis Benton, managing director, Philadelphia Textile Manufacturers' Association; Dr. Edward W. France, director, Philadelphia Textile School; Bradley C. Algeo, president, Philadelphia Textile School Alumni Association; and R. B. Mateer, secretary, American Institute of Electrical Engineers, Philadelphia section, 1000 Chestnut Street, Philadelphia.

NOTES OF THE TRADE

A quantity of dyed silks was destroyed in a recent fire which burned out the benzine shop of the United Piece Dye Works at Lodi, N. J.

The Eckhouse & Gerard Corporation has been organized to import, export and deal in chemicals, oils and allied products. The company has opened offices at 303 Fifth Avenue, New York. It is understood that some very attractive foreign connections have been secured, which will enable it to enter this market in an unusually favorable position on certain materials.

The textile firm of Kuhlmann et Cie., of Mulhouse, France, is about to raise its capital from 5,000,000 to 7,500,000 francs. The new shares will be issued at 200 per cent.

A study of the unsaturated hydrocarbons in industrial gases is being made by the Bureau of Mines with a view to developing economic methods of the manufacture of alcohols from them. Ethyl and propyl alcohols in particular are being sought. Gas distilled from a mixture of oil and coal at present is being studied in co-operation with the Trent Process Corporation, of Washington.

The Hope Textile Company, Providence, R. I., has been incorporated, under the laws of Rhode Island, with a capitalization of $25,000, to engage in a general textile business, by Alfred G. Chaffee, John A. Bennett and Ira Marcus.

The Elm Converting Company, Philadelphia, Pa., has recently installed sufficient additional machinery in the winding department to double the capacity of the latter. The production has been increased to 30,000 pounds weekly.

The Jersey Knitting Company, Springfield, Mass., has been incorporated, under the laws of Massachusetts, with a capital of $50,000, to manufacture, import and export

cotton, wool, silk, flax and textiles, by Theodore W. Ellis, president; John H. Mitchell, Springfield, treasurer, and H. Leonora Coolidge, director.

The Anchor Silk Throwing Company, Phillipsburg, Pa., has been incorporated for $50,000. Robert B. Stauffer is one of the incorporators.

The Colored Worsted Mills, Providence, R. I., will begin production in the new addition to its plant in March. It is reported that the new annex will provide work for forty-five more operatives. Alfred H. Lister is president and buyer, and Benjamin F. Lister is treasurer and superintendent.

The British Industries Fair, which will be held in London February 27 to March 10, will exhibit chemicals for the first time. The display is to be a most comprehensive one of the products of the British chemical industry in all branches. At previous London fairs only drugs and druggists' sundries were exhibited, but the coming exhibition will include all chemicals ranging from fine chemicals for research and medicinal purposes to heavy chemicals.

The Allrite Knitting Mills Company has been incorporated, under the laws of Delaware, to deal in finishing, dyeing, in knitted goods, etc., with a capital of $100,000. Incorporators are: T. L. Croteau, M. A. Bruce and C. H. Blaske, Wilmington, Del.

The spring meeting of the National Association of Cotton Manufacturers will be held at the Hotel Somerset in Boston on April 26, 27 and 28. Secretary Meserve promises an interesting program.

The Peerless Silk Dyeing Company, Philadelphia, Pa., has been reorganized and the entire legal capital stock has passed into new hands. W. S. Bradway is president, Henry Farquhar treasurer and Willis Farquhar secretary. The new concern will continue operating under the old name.

The Akra Sales Corporation, New York City, dyes and affiliated products, has been incorporated with a capital of $6,000. The incorporators are E. Grube, R. H. Korn and P. Arnaud. The company is represented by A. T. Scharps, Tribune Building, New York.

The Union Ribbon Company and the Alden Silk Company, 48-68 Gray Street, Paterson, N. J., have been consolidated. The new corporation has a capital of $260,000. The directors are Alexander McDonald, Harry E. Crowter and Ellis Lord, all of Paterson.

The Imperial Cotton Mills, Los Angeles, Cal., now being formed, are to build a cotton mill with a reported equipment of 20,000 spindles. The site of the mill, it is believed, will be in the vicinity of Vernon. An expenditure of $1,000,000 is involved.

Walter Eyers, superintendent of the Windham Manufacturing Company, South Windham, Me., has severed his connection with that company to accept a position as superintendent with the Wilton Woolen Company, Wilton, Me.

A new idea and a very practical achievement has been attained by Cheney Bros. in a new panne velvet ribbon. It is called "Veltyn," and is for millinery purposes as well as for dress trimmings. In a most ingenious way the new panne has been worked out so that the objectionable features of the ordinary pan velvet ribbon are overcome. Veltyn may be rubbed up or down without disturbing the nap, which remains perfectly smooth when so handled. This ribbon is wound on spools instead of on the usual long reel, and it is obtainable in various widths and in all colors.

The Trenton Hosiery Mills, Broad Street Bank Building, Trenton, N. J., has been incorporated, under the laws of New Jersey, to knit, manufacture, finish, buy and sell hosiery of all kinds; to buy and sell dyestuffs and related chemicals and oils; to buy, sell and spin cotton and mercerized yarns of all kinds; to buy, sell, throw and wind silk and silk threads; to buy, sell, throw and wind artificial silk and fiber threads; to manufacture, buy and sell products and things used.

The Penn-Victor Hosiery Mills, Reading, Pa., has been organized for the manufacture of women's hosiery. Irvin Binkley & Son are the proprietors. The equipment comprises five 220-needle latch needle machines, one looper and one welter. The company buys 26s single cotton yarn.

It is announced that operations will be resumed immediately by the H. C. Frick Coke Company, Pittsburgh, Pa., at three of the coke-making plants in the northern end of the region. These plans have been idle more than a year. Other ovens have been ordered fired at plants now in operation, principally in the south end of the region. These operations mean the employment of about 1,200 men. One of the plants to be put in commission employs 500 men.

Pima Textile Industries, Phoenix, Ariz., is preparing plans for building a cotton mill with equipment of 1,000 looms. While it is not stated where the mill will be located, it is understood that a site on the Pacific Coast will be chosen. The capitalization of the company is $4,000,000. Shane Morgan is president and Edward C. Bradford is treasurer.

The acquisition by Crosses & Winkworth, cotton spinners, of the mills of William Heaton & Son, of Bolton, Lancashire, containing 263,000 spindles, brings the total spindleage of Crosses & Winkworth up to about 1,500,000, and will, it is said, make that company the largest spin-

ning concern in the world. The firm of Crosses & Winkworth Consolidated Mills, Ltd., was registered in March, 1920, and at that time was said to own thirteen mills.

The Star Hosiery Mill, of Spartanburg, S. C., has been purchased by the A. B. Victorious Company, New York, which operates a chain of hosiery mills in the South. The mill continues operation under its present name. The manager is J. C. Lloyd, formerly secretary of the company.

The "Knit Goods Bulletin," organ of the National Association of Hosiery and Underwear Manufacturers, has suspended publication. The magazine was launched in 1908 as a medium for the exchange of information among the members of the association. With the passing of the "Bulletin" a special News Letter will be issued each week, which, it is thought, will serve the members of the association to better advantage.

The Beverly Chemical Company, Boston, Mass., has been incorporated with a capital of $25,000. William J. Sullivan, 12 Stoughton Street, Medford, Mass., is president and treasurer.

Manager Chester I. Campbell, 5 Park Square, Boston, Mass., is sending out space diagrams for the Eighteenth Annual Knitting Arts Exhibition to be held in the Commercial Museum, Philadelphia, Pa., under the auspices of the National Association of Hosiery and Underwear Manufacturers, during the week of May 22. The price for space is $1.25 a square foot, including all necessary booth equipment. The first official allotment of space will be made about January 20 in Philadelphia. S. D. Bausher, president of the Association, is chairman of the special exhibit committee. H. S. Horrocks, of the H. Brinton Company, Philadelphia; F. A. Rakestraw, of the Hyde-Rakestraw Company, Philadelphia, and J. N. McCullaugh, consulting industrial manager of the Association, are members of the committee.

Announcement has been made by Louis Friedman, 2229 Creston Avenue, New York, formerly of the Friedman Dyeing Company, 386 Second Avenue, New York, specializing on the dyeing of artificial silk and bisca straw cloth, to the effect that he has severed his connection with that concern, of which he was president and organizer, and is now at liberty. He is a graduate of the Philadelphia Textile School, from which institution he went to the dyestuff testing laboratory of Marden, Orth & Hastings Company. He was a Government textile tester for two years, and during the war served in the Quartermaster Corps in charge of the laboratory at Schuylkill Arsenal. Later he formed a connection with Walter F. Sykes & Co., and was for two and one-half years in the dyestuff testing laboratory of that concern, which he left to organize the Friedman concern.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

J. N. B.—*Question:* Is there any advantage in chroming a sulphur black on cotton, or is it a useless expense?

Answer: Sulphur blacks are not greatly improved in shade by chroming, and they generally become a few shades redder; but their fastness is greatly increased and, what is even more important, there is then no danger of the goods becoming tender in storage or after cross-dyeing, scrooping or any operation in which acids are used. Consult Whittaker's book on dyeing for a full account of the dyeing of sulphur colors, and note how necessary it is to destroy, by oxidation, the loosely combined sulphur which changes to sulphuric acid and tenders the cotton. As most of the objections to sulphur colors are based on the tendering of the goods, we believe that after-chroming should always be done to avoid further trouble.

W. H. D.—*Question:* What is the proper dyestuff to use in coloring iron gallate ink, and how can it be best tested for this purpose?

Answer: In pre-war times the dye used was Rein Blue 6B, sometimes called "Rhine" Blue. This was the extreme green shade of Cotton Blue, an alkali salt of the trisulphonic acid of aniline blue base. Ordinary Alkali Blue is the monosulphonic acid, Soluble Blue the disulphonic acid and Cotton Blue the trisulphonic acid. The commercial dyes are the sodium salts and are soluble in water, but the addition of acid separates the color acid.

In testing, make a solution of 1 to 100 of the dye in water and add an excess of sulphuric acid and allow to stand for half an hour. Alkali Blue, under these conditions, when spotted on filter paper will show a heavy precipitate with a ring of clear water. Soluble Blue will show some precipitate and a tinted ring, but the proper dye for ink will show no precipitate, only a strong blue color to the edge of the spot.

R. H.—*Question:* Which class of dyes is most suitable for coloring gelatine, and which is the fastest?

Answer: Gelatine sheets for spotlights and theatrical purposes are colored with both basic and acid dyes. We have no data regarding fastness, but have heard from manufacturers that certain dyes like Fuchsine stand light a long time, while Methylene Blue, which is faster as a cotton dye, fades rapidly. Evidently you will have to determine the relative fastness by tests on your own material, because it is not a rule that a color that is fast on wool or cotton will be fast when on a gelatine film. If your work is in connection with motion pictures, the situation is still different on account of the chemical union of the dye with the silver salts forming the picture and the short duration of each exposure to the light.

C. S. R.—*Question:* What is the safest way to strip acid dyestuffs from wool without injuring the fiber in the slightest degree?

Answer: Acid dyes on wool will generally strip slightly if put in a fresh bath with about 25 per cent of Glauber's salt at a boil. The action of the Glauber's salt is to lessen the hydrolysis of the acid and at the same time its effect on the color. Sometimes, however, there is so much acid combined with the color and the wool that the dye refuses to come off. In such a case you may add soda ash in small portions till the acid is neutralized then the dye will begin to bleed into the bath without there being present any alkali to harm the wool. A slight excess of alkali is not harmful, providing it is washed out later; but it should never be allowed to dry in the wool.

In every case stripping should be commenced in this manner and all the color removed that is possible in this way. When all the color is to be stripped, the soda strip should be followed by stripping with zinc sulphoxalate-formaldehyde (pre-war name: "Decroline") and acetic acid. This requires at least 20 per cent of acetic acid and a boiling for twenty minutes or longer. After stripping, wash well and neutralize with soda at 120 deg. Fahr. Delicate fabrics have been treated by this process without harm, but, as with all such methods, the important point is to wash out all traces before redveing.

Review of Recent Literature

The Fundamentals of Color Research for Textiles. Hibbard S. Busby. "Textile World," February 4, 1922, p. 146.

In discussing the various types of standardization in use, the author maintains that no one "color theory" or method of analysis should be accepted as "the method of all outdoors" and a general solution of color difficulties. Each method, each system, offers advantages in certain problems, and the function of the investigator is to apply the particular one of these methods which best fits the need. Many isolated researches in color, optics and general physics have been demonstrated, recently, to have a bearing on such problems; only the research worker with the broadest viewpoint and the widest range of experience in varied lines may visualize the problem in such a manner as to offer the proper solution.

Certain types of standardization call merely for a means of matching which is repeatable. Frequently, however, it becomes necessary to study the hue or other relation that exists between two or more color effects from a viewpoint that will make it possible to interpret the analyses in terms of the laws which govern optical and color relations. Another means of analysis of great value is that in which the record is expressed in terms of the mixture of variable quantities of reflected color and interpreted through geometrically arranged diagrams; while another—most annoying—problem to be met is the specification and registration of colors that are "nearly white" and those that are "nearly black."

Three factors of specification of a color are recognized by scientists to-day, and the author provides a chart showing in chronological order the terminology applied to the following definitions: The quality which distinguishes the difference between such sensations as blue, green, red, etc.; degree of purity or degradation of a color as it is clarified or dulled by the addition or subtraction of gray, and the gradation of a color from light to dark. He contends, however, that to the man in the application laboratory who must interpret such effects as texture, sheen, etc., these are insufficient, and a study of purely non-chromatic properties has been necessary in order to supply the material essential to repeating these auxiliary-to-color effects in a medium other than that native to them. The motive for laying stress upon a factor of research which may appear, at first glance, to include only a very limited field of effort, is found, author holds, in the fact that within the past five years the departure of process research from the purely chemical to include the study of minute physical phenomena has brought about an unprecedented advance of the arts.

No association of persons who use color in their industries, nor any particular isolated one of them, can obtain any benefit from the vast range of applications offered by the science without a rigid preliminary survey based upon: The economics and finance of the problem, the necessary technical skill and color knowledge, a clear agreement between client and adviser as to the ends desired and the allowable methods of approaching them, and, finally, the drafting of a definite program and the delegating of sufficient authority for its successful culmination.

British Patent 169,167. Alpha-Aminoanthraquinone. issued to the Society of Chemical Industry in Basle, Basle, Switzerland.

In this is described a process for preparing alpha-aminoanthraquinone by heating alpha-anthraquinonesul-

phonic acid with ammonia, in the presence of a sulphonic acid of an aromatic nitro compound. One method of procedure is as follows: 165 parts potassium alpha-anthraquinonesulphonate, 500 parts of ammonia solution, 24 per cent strength, and 60 parts sodium nitrobenzenesulphonate are heated together to 160 – 165 deg. Cent. in an autoclave for twelve hours. After cooling, the contents of the autoclave are filtered and the alpha-aminoanthraquinone formed washed with boiling water. The yield will be about 80 per cent. Aniline sulphonic acid can be recovered from the filtrate.

A Systematic Qualitative Chemical Analysis. George W. Sears, Ph.D., Associate Professor of Chemistry, University of Nevada. Cloth; VI plus 119 pages; 6 x 9; four figures; $1.75. New York, John Wiley & Sons.

This work is a textbook providing a complete scheme of qualitative analysis, containing an entirely new and systematic method for acids. This is based on the same principles of separation and detection as are commonly used in metal analysis, and has proved successful, author declares, in the hands of the students at the University of Nevada for the past two years. The general arrangement of the text matter is the outgrowth of more than ten years' experience with beginning students, and not only trains the student in the methods of analytical chemistry but also in the principles underlying chemical reactions from the standpoint of mass action. With a few necessary exceptions, only qualitative methods are used.

The contents embrace: Part I. Introduction. Laboratory Suggestions. Part II. The Systematic Analysis (Cations). Preparation of Solution. Discussion. Questions for Review. Part III. Acids (General Statement). The Systematic Analysis (Anions). Preparation of Solution. Discussion. Questions for Review. Appendix I. Preparation of Reagents. Appendix II. Preparation of Test Solutions. Appendix III. Table of Solubilities. Appendix IV. Table of Atomic Weights.

Dress, Blouse and Costume Cloths. Roberts Beaumont and W. G. Hill. London, Sir Isaac Pitman & Sons.

In the production of dress, blouse and costume cloths, cotton, woolen, worsted, linen, silk and artificial silk are all employed, singly and in combination, and all known weave structures utilized; consequently an extremely wide knowledge of weave construction and the properties of the principal textile fibers is required. The authors have treated the subject at length, covering 570 pages and including more than 700 illustrations, the work being divided into ten chapters. Industrial and commercial aspects of dress-goods designing and production are treated, and there is a separate chapter devoted to thrown, spun and artificial silk. The yarn unit as a controlling factor in fabric design and textural quality is treated at length. Weave elements as they affect cloth construction are dealt with, and separate chapters are devoted to drafted patterns, stripes, geometric design bases and weave compounds, spotted and mosaic patterns, practice in figure designing, pile, lappet and gauze structures. The entire work bears the stamp of authority and should be invaluable to anyone engaged in the production of this class of goods.

Recent Patents

Treatment of Artificial Goods from Viscose

(1,404,535; January 24, 1922)

Max Luft, Boras, Sweden

This relates to the treatment of artificial fabrics, filaments, tissues, films and the like from viscose with water-repellent or water-proofing means, and it consists in the manner in which the materials are treated.

It is well known in the manufacture of artificial fabrics, as artificial silk, films, plates and the like, from viscose (solutions of cellulose-xanthate) to separate the sulphur and its compounds accumulating in the said goods during the decomposition of the xanthates by treating them with solutions of sulphides of alkali.

The artificial goods are treated with solutions of soap or with water-proofing means while the process of separating the sulphur and its compounds from the said goods is going on. It has been found that during this process the viscose is very capable of absorbing soaps and water-proofing ingredients. The sulphur leaving the interior of the capillary filaments causes the instant formation of pores in the filaments and renders their walls permeable so that the soap and the impregnating means are uniformly incorporated into the artificial goods without weakening them.

By this combination of the simultaneous separation of the sulphur from the fabric or the thread and the incorporation on its place into the hollow structure of the viscose-products of the finishing ingredients, as soaps, solutions of gum or any other water-repellent or water-proofing means, the operator is said to attain a considerable advantage as against the known methods for softening or impregnating of fabrics which might likewise be used for viscose.

The treatment is carried out in a single-bath process. The soap may be added in an alkaline solution to the solution of sodium sulphide. Or if the fabrics are at the same time to be impregnated, the metallic salts, the solution of gum, resin or salts of resin (metallic resinates) are solved or emulgated with an addition of a small quantity of alkali and this solution or emulgation is added to the desulphurizing bath before the fabrics are brought into it. The bath is kept during the treatment, which lasts one-half to one hour, on a temperature of 40 to 50 deg. Cent. Repleted with an addition of fresh sodium sulphide, soap or of the impregnating means, the bath may be repeatedly used. The treated goods are freed from the excess of the bath, acidified, washed in plain water

or in a solution of soap, centrifuged or squeezed and dried at a temperature of 40 to 50 deg. Cent. The concentration of the desulphurizing bath, of the solution of soap and the impregnation means depends in a wide range upon the goods to be treated and upon the degree of the required properties as to the softness, the luster and the elasticity.

Examples of the treatment bath are as follows:

1. A watery solution is prepared containing 3 per cent sodium sulphide, 2 per cent soap, ½ per cent caustic soda. The finished raw silk in skeins is treated in this bath for about one-half to one hour at a temperature of 50 deg. Cent.

2. The bath contains 3 per cent sodium sulphide, 2 per cent soap, 2 per cent caustic soda, 5 per cent aluminum acetate.

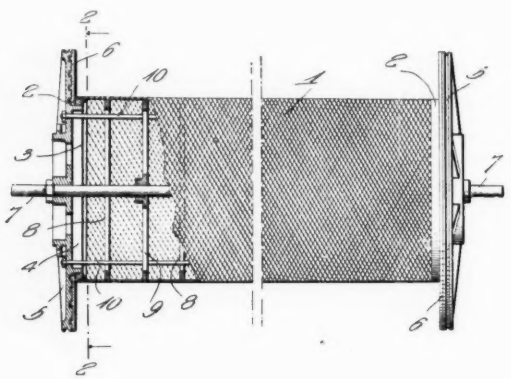
The treatment of the silk is the same as in the first example.

Warp Dyeing Beam

(1,404,634; January 24, 1922)

FRANK M. MORTON, Phoenix, Ala.

This invention relates to an improved warp dyeing beam and one object of the invention is to provide a beam having a cylinder of woven fabric provided with packing rings at the ends of the cylinder which are formed of lead or other non-corrosive metal and have the end portions of the fabric cylinder embedded therein, the packing rings fitting upon inwardly extending annular flanges carried by the heads of the beam. By providing the cylinder with packing rings at the ends of the cylinder and having these rings fitting upon annular flanges of the heads, a head may be easily removed and a new one put in place in case it should become broken, and, further, the beam can be easily and quickly taken apart and put together when necessary.



The illustration is a view showing a dyeing beam partially in elevation and partially in section, and showing the cylinder of the beam provided with the improved packing rings at its ends.

This improved beam is provided with a cylinder 1 which is formed of woven wire fabric and having at its ends packing rings 2, which are formed of lead or other non-corrosive metal, and have the end portions of the wire fabric cylinder 1 embedded therein.

The rings 2 are thickened inwardly of the cylinder and in the form are cut away from their inner ends as shown at 3, so that the peripheral faces of these rings which fit upon the inwardly extending flanges or collars 4 of the heads 5 will be of the proper width to extend from the end of a flange 4 to the lead facing 6 of the head. When the beam is assembled, the shaft 7 extends longitudinally through the cylinder and the cylinder is supported and braced by means of the rings 8 and supported by the plates 9. The heads 5 which fit upon the shaft 7 are positioned at the ends of the cylinder, and when the nuts of the securing rods 10 are tightened, the packing rings 2 will be properly seated upon the inwardly extending collars or flanges 4 and have close contact with the lead facings 6 of the heads. If one of the heads should be broken, it can be easily removed and a new one put in place; or if it is desired to take the beam apart for cleaning or repair purposes, this can be easily and quickly done. It will thus be seen that by means of these packing rings 2 there has been provided a dyeing beam in which broken heads can be easily removed and new ones put in place and in which the beam can be easily and quickly taken apart and put together again. It should be further noted that these packing rings serve to reinforce the end portions of the cylinder and permit of easy assemblage, and also serve to form tight joints between the heads and cylinder so that the dye liquid cannot pass between the body of the beam and the two heads or disks, and will therefore be forced to pass through the perforated body and then through the yarn wrapped upon the beam. If the dye liquor is permitted to pass between the heads and the body of the beam, the yarn at the ends of the body will be dyed a deeper color than the rest of the yarn, and this will cause the yarn to be streaked with relatively light and dark portions when unwound.

Method and Device for Bleaching Textile Fibers and Fabrics, Tissues, and the Like

(1,404,467; January 24, 1922)

ROBERT MOHR, Eibergen, Netherlands (assignor of one-half to Naamlooze Vennootschap de Eibergsche Stoombleekerij, Voorheen G. T. Ten Cate en Zonen, Libergen)

This invention relates to a process and apparatus for bleaching textile products, textile fibers and the like without boiling and by means of chlorine or oxygen, whereby loss of chlorine and oxygen is prevented as much as possible, and the gas that is liberated from the bleaching liquor is collected and returned to the latter to be absorbed therein. As is well known, chlorine or active oxygen is liberated very quickly at high temperatures and these gases are then regarded as lost in the process hitherto in use. The designed apparatus aims to prevent such losses.

The process consists in first charging the bleaching vessel with goods to be bleached and with the bleaching liquid. The vessel is then closed and a pressure of 2-3 atm. is developed and maintained. The bleaching liquid is kept in circulation, passing not only through the bleaching vessel but also through an expansion vessel and a filtering or saturating tank, or both.

Care should be taken that the air is pumped out of the expansion vessel until a continuous vacuum is obtained. The bleaching gases developed in this vessel are returned into the saturating tank, while the liquid in this vessel passes a filtering material so as to remove the suspended particles.

Devices wherein other reservoirs are connected with the vessel are known. These, however, differ materially in construction and function from the device of the invention, inasmuch as this latter is intended to prevent the presence of air in the vessel to keep up the strength of the bleaching liquids and to effect continuous cleansing.

The chlorine or oxygen which is set free is, according to this invention, sucked by a compressor again and the bath is saturated anew in a saturating vessel. Accordingly, only the quantity of a bleaching agent required for the goods is used. Therefore there are no losses, the process is more economical and the bleaching action of the liquid lasts longer. As the process is carried out under pressure, the bleaching power of the active oxygen is much greater and accordingly the bleaching action is remarkably strong.

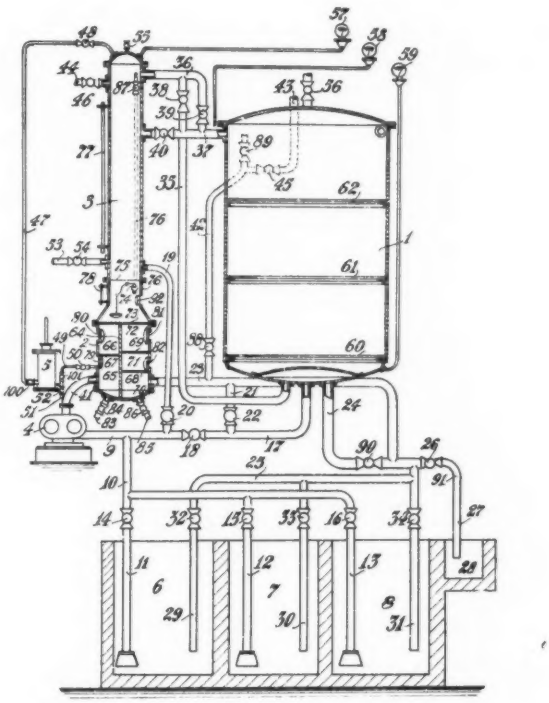
The device to be specified below in connection with the process is such as to make possible the treatment of the raw materials and products of the textile fabrication with different baths. Either chlorine, acid or oxygen may be used, and finally an after-treatment with soap.

In the process, according to the invention, the bath can be used as economically as possible, and in case of cotton efficient bleaching without boiling is effected. The working temperature need not exceed 80 deg. Cent. Linen yarn needs only one single previous boiling with 2 per cent chlorine and passes out of the device nearly bleached, while in the process hitherto in use three or four boilings were required. The treatment in the device is exceedingly delicate, and gives little chance to damage, so that it is possible to bleach also fine materials, in particular curtains, lace and like materials.

The illustration shows the device schematically, partly in side view.

The device consists of a bleaching vessel 1, a saturating and filtering vessel 2, an expansion tank 3, a circulating pump 4, an air pump or compressor 5, the vessels 6, 7 and 8 for the liquid, and pipes connecting these parts and provided with cocks for controlling the direction of the bath liquid.

Connected with the suction pipe 9 of the pump 4 by means of a pipe 10 are the suction pipes 11, 12 and 13 of the bath liquid reservoirs 6, 7 and 8, which suction pipes are provided with cocks 14, 15 and 16; the pipe 9 is also connected to the bleaching vessel 1 at the bottom of a pipe 17 having a cock 18, and to the expansion vessel 3 below by a pipe 19 having a cock 20, and also to the filtering vessel 2 by a communication pipe 21, with cock 22 issuing from the part 17. A connection pipe 23 ends in an outlet pipe 24, which issues from the bottom of the bleaching vessel 1. To the pipe 24 are connected the common return pipe 25 to the liquid reservoirs 6, 7 and 8, and the outlet pipe 27 provided with a cock 26 to the outlet channel 28. Three return pipes 29, 30 and 31 of the liquid reservoirs 6, 7 and 8 are connected with the



return pipe 25 and are provided with cocks 32, 33 and 34. The bleaching vessel at the bottom is connected by a vertical pipe 35 with pipe 36, which runs from the top of the expansion tank 3 to a tube 37 immediately connecting the bleaching vessel with the expansion tank. The pipe 35 is provided with cock 28 before the connecting point with tube 36, and the latter tube is in the same way provided with a cock 39 before the connecting point with tube 37. The connecting tube 37 is provided with a cock 40 between expansion tank 3 and the connection with tube 36. Pump 4 is connected with the filtering and saturating vessel 2 by a delivery pipe 41; the pipe 23 issuing from the saturating vessel is connected with pipe 42, which is connected with the upper part of the bleaching vessel. The latter and expansion vessel 3 have water-supply pipes 43 and 44 provided with cocks 45 and 46, respectively. The compressor 5 is connected on the one hand by a pipe 47 provided with cocks 48 and 100 with the top of the expansion vessel 3, and on the other hand by a tube 49 provided with cocks 50 and 101, with the lower parts of the filtering and saturating vessel 2. A pipe 51 with cock 52 branches from tube 49, before the cock 101.

The expansion vessel 3 has below a steam supply pipe

153 provided with cock 54. Expansion vessel 3 and bleaching vessel 1 are provided at the top with air cocks 55 and 56, respectively.

The manometers 57, 58 and 59 are connected, respectively, with the upper part of the expansion vessel 3, with the connection tube 37 between the latter and the bleaching vessel 1, and with the lower part of the bleaching vessel.

The bleaching vessel is divided into a plurality of sections—e. g., three, according to the quality of the goods to be bleached and the size of the vessel—by means of removable perforated bottoms 60, 61 and 62. These bottoms consist of three parts, with a view to the ready removal and returning, and are constructed as liquid distributors. Such a bottom consists of a grating of bars, lens-shaped in section, arranged at a distance of about 2 mm. apart, for carrying the goods under treatment.

These liquid distributors completely prevent the passage of the goods, and as the liquid is checked against the grating it distributes itself and sprinkles the goods below. Furthermore, the packing of the goods is prevented, because the goods are carried by the grating. Where the pipes 17, 24 and 35 discharge into the bottom of the bleaching vessel their ends are covered with a curved sieve. The upper part of the filtering or saturating vessel 2 is narrower than the lower part. The lower part is divided into two compartments by vertical partition 64, one of which compartments is connected with the pumps 4 and 5 and is divided into two subdivisions 65 and 66, which are separated by a sieve 67, while the other compartment is divided into three subdivisions 70, 71 and 72 by means of two sieves 68 and 69. The upper subdivisions 66 and 72 are separated by a sieve 73 from the uppermost narrow space of the filtering and saturating vessel. At this place a float valve 74 is provided below the bottom 75, separating the two vessels 2 and 3. The float valve 74 cuts off a connecting pipe 76 opening into the upper end of vessel 2 and discharging at the other end below the cover of the expansion vessel 3. This pipe is provided with a cock 87. The expansion vessel 3 is provided with a gauge glass 77, and in the same way the upper part of the vessel 3 is provided with a gauge glass 77. The subdivision 72 of vessel 2 is charged with coarse excelsior and the subdivision 71 with fine excelsior. The subdivisions 65, 66, 71 and 82 have manholes 79, 80, 81 and 82 for cleansing purposes. The float valve in the upper part of the filtering and saturating vessel may be examined by means of a manhole 92; moreover, both compartments or divisions are provided at the bottom with discharging tubes 83 and 85, having cocks 84 and 86, respectively. Finally pipe 42 has another cock 88 in the lower part and the cock 89 in the upper part between the place of discharge into the bleaching vessel and the connection with the water conduits.

With this device all kinds of fabrics woven from vegetable fibers, light or heavy, can be bleached completely after previous maceration and more efficiently than hitherto by either sodium hydroxide or lime bleaching. The formation of oxycellulose and stains, damages and deformation of the material by rough treatment are excluded, besides the bleaching is cheaper than with any known bleaching process. A different treatment can be executed subsequently without removing the goods from the apparatus. In this way the goods are saved, besides the required labor being less. The saving of the goods is chiefly effected by making boiling superfluous.

Process of Bleaching Material

(1,404,242; January 24, 1922)

Harry B. Smith, Albany, N. Y.

The kind of material to which this process is primarily adapted is unbleached cotton goods containing motes, shives and (or) leaf. The process is applicable, however, to any material containing vegetable or animal fiber, such as any class of cotton goods or yarns, wool, silk, fiber silk or mixtures of same.

One of the objects of this invention is to provide an improved process of bleaching such material which is simple, efficient and requires only a relatively short time.

Inventor employs an alkaline oxidizing agent which is preferably composed of about half each of peroxide of sodium and a salt of an alkali metal, such as sodium chloride, soda ash, silicate of soda, caustic soda, phosphate of soda, alone, or a mixture of any of these salts. The combined weight of the peroxide of sodium and salt of an alkali metal is preferably about 7 per cent of the weight of the cotton material under treatment. A solution of these chemicals is strongly alkaline and at the same time oxidizing. Because it is strongly alkaline the time required for removing the motes, shives and (or) leaf is relatively short. At the same time the alkalinity is not sufficiently intense to harden the material to be bleached. This solution has been found to operate with entire satisfaction, but it is understood that any oxygen liberating product, but preferably those corresponding to the "per" salts and preferably for a purpose hereinbefore stated, along with the salt of an alkali metal, will give satisfactory results. For instance, peroxide of hydrogen, percarbonate of sodium, persulphate of sodium or persilicate of sodium may be used with a suitable salt of an alkali metal or a mixture of salts such as those mentioned above. Inventor has, however, obtained the best results with peroxide of sodium.

The dyes preferably used for bluing are alkali blues, inasmuch as they are substantially operatively unaffected by the oxygen yielding compounds and alkalies which are used in the process. Inventor has, for example, employed in practice as a suitable dye that having the trade name "Alkali Blue RS." These dyes and their chemical composition are well known in the art. They are acid dyes: that is, they require an acid to render them effective. Such dyes cause a very brilliant whiteness in the bleached material. While various acids might be used for this purpose, inventor prefers an organic acid, such as acetic acid. Such an acid does not attack the fiber of the cotton and gives very satisfactory results in bluing. Furthermore, by its reaction with the sodium peroxide or its

equivalent it liberates oxygen while the bath is at a high temperature, which greatly assists the bleaching operation. At the same time it destroys the organic coloring matter in the cotton, thereby increasing the whiteness of the material.

The goods are first washed with boiling water, as is usual in the art, to remove greasy or waxy foreign matter from the fibers. The cotton material is then passed into a bath at normal atmospheric temperature containing the alkali blue. About 50 grains of the dye may be used to 100 pounds of the cotton material. This bath is allowed to work on the material for about fifteen minutes. The acetic acid is then added to the same bath to develop the color. The acetic acid may be in amount about 2 per cent of the weight of the cotton material. After the acetic acid has been added, the bath is allowed to act upon the material about ten minutes longer, after which the bath is brought to a high temperature, preferably between 170 and 180 deg. Fahr. It is unnecessary to bring the bath to a boil and preferable not to do so. Sodium peroxide and sodium chloride or other alkali metal salt, in the amounts previously mentioned, are now added and the bath maintained hot, preferably between 170 and 180 deg. Fahr., for a considerable period of time. An hour and a half is ample for this last step. It is the function of the sodium chloride or other alkali metal salt to aid in the development and fixation of the coloring matter on the fiber, as well understood in the art.

During the process the motes, shives and (or) leaf are subjected to a chemical action which probably softens and dissolves them.

Machine for Making Tulle

(1,404,373; January 24, 1922)

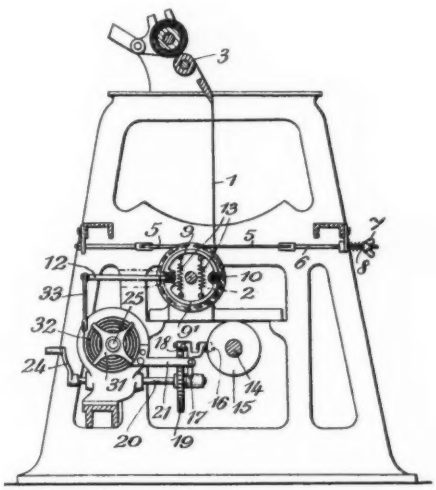
EMANUEL CAVICELLI, St. Margarethen, near Munchwilen, Switzerland (assignor to the Firm Schweiz, Gesellschaft fur Tullindustrie A.-G., Munchwilen)

This invention relates to machines for making tulle or bobbinet and more particularly to a combination warp beam brake for such machines.

The tension of the warp threads in tulle machines is preferably produced by braking the warp beam. As is known, the tension of the weft threads —that is to say, of the diagonal spool threads—continuously increases during the working process, and the tension of the warp threads must be increased to a corresponding extent in order to avoid any deformation of the hexagonal mesh or loop structure. To that end, the band or rope brake with which the existing constructions of tulle machines are provided are in most cases more strongly applied by the hand of the tulle weaver during the working process. Constructions are also already known in which the increase of the braking action of such a brake is automatically produced in dependence on the rotary motion of the warp beam. This brake construction cannot, however, be applied with a satisfactory effect to modern heavy tulle machines, as in the case of unavoidable higher brake pressures in heavy tulle machines the brake devices not only lose their sensitiveness but fail altogether. The faces of the brake disk become corroded or damaged when steel cables are used. If hemp ropes are used, the braking is affected by the influences of the different heat and moisture conditions. In both cases the action is exceedingly injurious to the nature of the fabric produced.

This invention relates to a brake device for the warp beam, in which the above mentioned drawbacks are avoided.

According to this invention, a combination brake is provided which comprises a braking means by which the



normal tension of the warp threads is produced at the beginning of the working and maintained constant during the whole working period, and additional braking means which produce an additional braking action increasing during the working process and derived from the rotary motion of the machine.

The illustration shows a side elevation of a tulle-making machine provided with the device.

In this drawing, 1 indicates the warp threads which are unwound from a warp beam 2, then woven into a fabric by the two wefts, and wound over a suitable breast beam 3 and pressure roller onto a cloth beam in the form of a finished fabric. To the warp beam 2 is firmly secured a brake pulley 4, the rim of which is provided with flanges between which is mounted a brake band 5, one end of which is secured to the machine frame, while the other end is secured to a pull rod 6. The rod 6 is provided with a screw thread and can be pulled by hand by means of a thumb nut 7, which through the intermediary of a spring 8 presses against a support provided on the frame. In that way a braking action can be exercised on the brake pulley 4, and therefore on the warp beam 2. On the inner circumference of the rim of the brake pulley are provided two brake jaws 9 and 9' which are rotatably mounted on a pin 10 secured to the machine frame and can be pressed against the rim of the pulley by means of a cam 11 arranged diametrically opposite the pivot pin 10 and rotatably mounted on a pin secured to the frame.

The cam 11 is turned by means of the brake lever 12 and presses the two brake jaws apart and against the inner face of the pulley rim. Two springs 13 bring about the withdrawal of the brake jaws from the brake pulley and their return to the initial position, when the lever 12 is brought back to its original position at the beginning of the working process. The gradual tightening of the brake lever is brought about by the rotation of a driving shaft 14 in the following manner:

To the shaft 14 is secured a pulley 15 provided with a cam face, which at each revolution acts on a roller 16. The roller 16 is secured in a cranked lever 17 which carries on the other arm a pawl 18 engaging with a ratchet wheel 19.

The ratchet wheel 19 is secured on a spindle 20 on which the lever 17 is mounted so that it can swing on it. The roller 16 is pressed against the pulley 15 by a spring (not shown in the figure) secured to a fixed arm 21, and at each revolution of the shaft 14, owing to the rolling over the cam face, experiences a movement in a plane at right angles to the spindle 20. Owing to this operation the lever 17 swings about the spindle 20 as its axis of rotation, and the pawl 18 turns the ratchet wheel 19 and the spindle secured to it, to the extent of at least one division. On the spindle 20, which is mounted in the casing of a worm gear 22, 23, is mounted a worm 22 which is in engagement with a worm wheel 23, and, further, at one end of the spindle there is also provided a crank handle 24 for operating the spindle by hand. The worm wheel is mounted loose on the worm wheel spindle 25 and has on one side of the worm a number (eight in the drawing) of interchangeable bolts 25^1 concentrically screwed in. On the worm wheel spindle 25 is keyed on one side of the worm wheel a ratchet wheel 26, which is driven by a pawl 27. The pawl 27 is mounted on a double-armed lever 28 mounted on a pivot pin on the worm gear casing. The rotation of the spindle 20 is transmitted by the worm 22 to the worm wheel 23. The oscillating movement of the lever is produced by the action of the bolts 25^1 on a cam 29 secured to the lever 28, owing to which the ratchet wheel is turned by the pawl to the extent of at least one tooth at each passage of one of the bolts 25^1 past the cam 29. By a spring 28^1 secured to the other arm of the lever 28, the latter is pulled back against a stop 28^2. Another pawl 30, rotatably mounted on the casing, is in engagement with the ratchet wheel 26 for the purpose of preventing the wheel from turning back. At the other end of the worm gear spindle 25 is secured a winch-like spider 31, between the arms of which is mounted a spirally coiled spring blade 32. The inner end of the spring blade or coil is secured to the hub of the spider, the outer end to a traction part 33 which connects the brake lever 12 to the spring 32. The rotation of the ratchet wheel 26 produces therefore a winding of the spring blade 32, owing to which a gradually increasing pull is produced on the brake lever arm, and therefore a constantly increasing braking action.

By changing the number of the bolts provided in the disk of the worm wheel, the gear ratio between the number of revolutions of the driving shaft and the number of revolutions of the spring blade spindle can be altered, and thus a modification obtained in the increase of the tension of the warp threads. Another method of regulating the gear ratio consists in the adjustment or shifting of the stops of the levers which carry the pawls. In that way it is possible to move the pawls back by the springs on the lever to such an extent that instead of engaging with the next tooth, they engage with the second, third, and so on, of the ratchet wheel, and during the next oscillation of the lever would turn the ratchet wheel to the extent of more than one tooth.

The combination of the brake lever with the spring blade has the great advantage of a braking action taking place in a yielding manner, owing to which the variations of the braking action, due to the friction differences in the sliding surfaces, are automatically equalized or compensated.

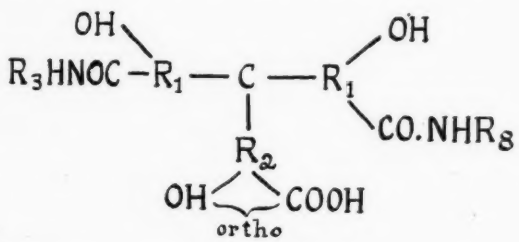
Dyestuffs Dyeing on Mordant, and Process of Making Same

(1,403,888; January 17, 1922)

MANFRED ALIOTH and ERNST BODMER, Basel, Switzerland (assignors to Durand & Huguenin S. A., Basel)

Inventor describes a process for the manufacture of new red dyestuffs dyeing on mordant, consisting in arylidating an aromatic o-oxycarboxylic acid, reacting with formaldehyde on the arylido-o-oxycarboxylic acid thus obtained and oxidizing one molecule of the resulting aromatic methylene-diarylido-o-oxycarboxylic acid, together with one molecule of an aromatic o-ovycarboxylic acid.

Claim is made, as new products, for the red sulphonated dyestuffs corresponding to the formula:



wherein R_1 and R_2 stand each for an aromatic nucleus, which may be substituted, while R_3 stands each for an aromatic nucleus substituted by a sulpho group, the said dyestuffs giving, when dyed on chromed wool and when printed on cotton with chromium mordants, red vivid tints of good fastness.

Stocking Examiner

(1,402,788; January 10, 1922)

MARGARET K. O'LEARY

Claim is granted, as an article of manufacture, for a device adapted to be inserted in a stocking for the examination thereof comprising a pair of pivoted wings, means to maintain said wings in substantial superposed alignment, and means to force said wings apart in separate parallel planes.